Designing And Evaluating An Educational Video Game For Children: A Blend Of Learning And Fun

BY

MOSHIUR RAHMAN

ID: 213-40-030

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Multimedia and Creative Technology

Supervised By

Md Salah Uddin

Assistant Professor & Head

Department of MCT

Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

15 NOVEMBER 2025

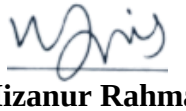
APPROVAL

This Project titled "**Designing And Evaluating An Educational Video Game For Children: A Blend Of Learning And Fun**", submitted by Moshiur Rahman (213-40-030) to the Department of Multimedia and Creative Technology, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Multimedia and Creative Technology and approved as to its style and contents. The presentation has been held on 15 November 2025.

BOARD OF EXAMINERS

Md. Salah Uddin **Chairman**
Assistant Professor & Head
Department of MCT
Faculty of Science & Information Technology
Daffodil International University

Arif Ahmed **Internal Member**
Professor of Practice
Department of MCT
Faculty of Science & Information Technology
Daffodil International University



Mizanur Rahman **Internal Member**
Assistant Professor
Department of MCT
Faculty of Science & Information Technology
Daffodil International University

Md. Abul Kalam Azad **External Member**
Senior Additional Operative Director
(Head of Creative)
Walton Digi-Tech Industries Ltd.

DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md Salah Uddin, Assistant Professor & Head of MCT** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:

Md Salah Uddin
Assistant Professor & Head
Department of MCT
Daffodil International University

Submitted by:

Moshiur Rahman
ID: 213-40-030
Department of MCT
Daffodil International University

`

ACKNOWLEDGEMENT

Firstly, I would like to thank Almighty God who gave me the strength, patience and courage to accomplish my final year project successfully.

I'm very grateful to my honorable supervisor Md. Salah Uddin, Assistant Professor & Head of the Department of Multimedia and Creative Technology, Daffodil International University for his invaluable guidance, inspiration and encouragement during this study. His skill with “Game Development” and “UI/UX Design” gave me the right direction for developing my work, also his positive feedbacks and guidance were inpiring to perfecting this project as much as I could.

My special thanks also go to the faculty members in the Department of Multimedia and Creative Technology, not only for their academic help but also for their cooperation to make a creative, innovative thinking and growth environment.

To my classmates, and friends: for all your encouragement, ideas and feedback through the development of this project.

Last, but never least - thank you to my wonderful parents and family for their love, words of encouragement and unwavering support during the course of my studies. Without their blessings and stimulus, it would not have been possible for me to reach this milestone.

ABSTRACT

This study, “Designing And Evaluating An Educational Video Game For Children: A Blend Of Learning And Fun”, aims to develop an interactive learning software product for children aged 3 to 7 based on game-based education. The main aim of this project is to bring fun and learn together by making a game that will educate the children in terms of relating alphabets, objects with numbers in an amusing way as well as it will improve their memory, attention and problem-solving ability.

The game is programmed in Unity 3D and currently supported for Mobile(Android) as well as PC. Players will be able to choose a character and roam through four interactive scenes: (1) Alphabet Adventures where kids collect letters and avoid obstacles, (2) Word Wonders where items correspond with real world objects like “A for Airplane” and “B for Bus,” (3) Number Kingdom where they gather numbers while learning them and (4) Quiz Challenge where players can try to answer quiz challenges. Reasoning interactions include such features as sound effects, animations and scoring to ensure interactivity and motivation.

A guided design and development process that integrates the concepts of UI/UX design, game mechanics, and user-centered learning will be adopted for the project. The game is anticipated to be fun as well as enhance recognition, memory and curiosity in children. In addition, the project demonstrates how educational video games can be an efficient resource for educators and parents to assist young learners.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1
INTRODUCTION

1.1 Background

The 21st century has witnessed the widespread use of digital technologies by children in their daily lives. When it comes to children and early age, the digital exposure is bigger than ever now days with interactive apps and animated learning videos. This in turn, has created opportunities for learners and developers to produce exciting and effective learning experiences. Educational video games, known as "edutainment," offer a innovative approach for integrating entertainment with directed learning. They are more than children's 'intrigue triggers'; they help students develop memory, problem solving and retention.

The project "Designing And Evaluating An Educational Video Game For Children: A Blend Of Learning And Fun", presents the EduQuest educational game for children from ages 3 to 7. The app brings alphabets, words, numbers and quiz to you in an interactive process of journey. Each phase is thoughtfully designed to promote a specific aspect of learning:

1) Alphabet Adventures is a fun filled app to help your child learn their ABCs and also train them with the art of reflex.

2) Word Wonders links letters to objects in the environment to reinforce vocabulary.

3) Number Kingdom makes it fun to learn math numbers.

4) Quiz Challenge helps increase memory, sequencing and problem-solving skills in conditions.

EduQuest Fusion of play-based learning and interactive storytelling, EduQuest is a learner-centric approach to overcome the restrictions of traditional education helping kids learn playfully with a structure. [1], [2], [6], [21], [22]

1.2 Problem Statement

The conventional school based learning style, which are methods that emphasizes rote learning particularly for younger children is not very interactive or playful. This creates several challenges:

1) Disengagement - Students have a short attention span when lessons are not as fun and engaging.

2) Low Long term retention - If you're just making your kids memorize alphabets, numbers, words.

3) Limited Customization- Conventional solutions cannot tailor themselves to the speed at which a particular child learns.

Reduced Motivation - With no immediate feedback or rewards, kids may lack motivation to practice further.

Many digital learning apps and games are either too straightforward, don't have a steady progression or not a healthy mix of fun plus education. Most games either focus on the fun of it while not being able to learn anything or they are challenging academics that aren't engaging enough. Thus there is a strong demand for an edutainment game that offers curriculum-based content in the correct amount and quality.

EduQuest fills that need by enabling organized game play with learning outcomes so that children enjoy the experience and return home with educational values. [4], [5], [13]

1.3 Research Questions and Objectives

Research Questions

Key questions that are essential in this study include: 1. How best can educational games be designed to check on the learning process without sacrifice of the entertainment value? 2. What are the best gameplay mechanic concepts that can be used to teach alphabets,

words, and numbers to children aged 3-7? 3. What occurs each time interactive storytelling is done, and the progressive challenge is used to maintain a child's attention and desire for learning? 4. Lastly, does the Quiz Challenge scene have any substantial impact on a child's cognitive despite on cognitive?

Objectives

The specific aims of this project include:

1) Design and implement EduQuest, a 3D educational video game to be developed for both mobile (Android) and PC.

2) To develop four escalating interactive scenes that engage various levels of early learning: letter and word recognition, numbers, quizzes.

3) To incorporate audiovisual feedback (e.g. a sound of "Aaaa" and "A for Airplane") to enhance memory and recognition.

4) For an easy-to-use child-friendly UI/UX design with a seamless roller stamper, colorful, simple and intuitive.

5) To trial and evaluate the game with children comparing achievements in recognition, vocabulary to problem solving.

1.4 Significance of the Study

The uniqueness of EduQuest is its possible contribution to the early childhood education and game-based learning research. This project provides:

For Children:

1) What the app is:A fun, safe, interactive way to learn basics (ABC, words, numbers).

2) A chance to discover through trial and error, play; breeding curiosity.

3) Practice and complete challenges with motivation for rewards and instant feedback.

For Parents and Teachers:

1) Companion software which can support traditional teaching methodologies.

2) A means to facilitate the progress of the children and ensure their active involvement in learning.

3) A bridge between home-based learning and classroom instruction.

For the Academic Community:

1) How gamification tools (such as points, challenges, rewards) can be used to help students retain what they learn: a case study.

2) A study into how sound, images and interaction enhance memory.

3) A model that can be generalizable to other areas of education (science, social studies and language learning for instance). [9], [10], [11], [12]

1.5 Structure of the Report

The report is structured as follows:

Chapter 1: Introduction - includes the background to project, problem statement, objectives, research questions and significance of the study.

Chapter 2: Literature Review & Related Works - The chapter provides a review of literature of previous research works related to educational games, cognitive learning theories and similar applications.

Chapter 3: Methodology and Design Specification - This chapter details the creation of College Quest, covering workflow, tools used, game mechanics and UI/UX design.

Chapter 4: Game Development & Implementation - Outlines the design and realization of EduQuest, scene by interactive scene.

Chapter 5: Product Outcome and Results - Describes the product that arose from this work and its gameplay along with the result of testing it in the testing Requirements User.

Chapter 6: Discussion and Future Work - Presents findings, strengths and weaknesses, suggestions for future work.

Chapter 7: Summary - Briefly summarises the main points that are discussed on the project and reflects its contribution.

CHAPTER 2
LITERATURE REVIEW & RELATED WORKS

The growing implementation of digital tools in education has contributed to the popularization of game-based learning (GBL) as a promising methodology for improving children's cognitive, linguistic, and mathematical skills. Conventional modes of instruction used for this purpose tend to make a child's rote brings indulged due to their deficiency in sustaining small kids' attention. In comparison, video games are able to offer interactive experience with immediate feedback as well as motivational reinforcement which is similar to the learning style of children that likes to play previously mentioned (Gee, 2003).

In this section we present the relevant literature in theoretical and educational background of games, in addition to on computer based learning applications (edutainment), as related research on alphabet, word, number, quiz learning systems. It also highlights the areas EduQuest aims to cover.

2.1 Theoretical Foundations of Game-Based Learning

Educational games rely on multiple learning theories:

Constructionist Learning Theory (Piaget, 1972): Children learn by doing real tasks in the real world, they are ideal learners for teaching tools. In EduQuest, scenarios such as Alphabet Adventures and Number Kingdom are also in accordance with constructivist theories, allowing children to "make sense of" the world rather than manually constructing meaning.

Behaviorist Theory (Skinner, 1957): Reinforcement and rewards determine learning outcomes. EduQuest employs positive feedback (e.g., sound, points, and animated letter/math character when drawing letters/numbers correctly) to promote repeated practice.

Cognitive Load Theory (Sweller, 1988): Instructional materials should minimize the occupation of learning active memory. By using child-friendly UI design, simplified

interactions and gradually increasing the difficulty, EduQuest can help you learn without overwhelming your cognitive capacity.

Flow theory (Csikszentmihalyi, 1990): Whether challenges or aptitudes are balanced is crucial to children's level of engagement. EduQuest is flowing through gameplay (from simple tasks of recognizing to quizzes with time limit).

These findings show that game-based learning can serve as an extension to early childhood education, by merging engagement with quantifiable educational benefits. [3],[6],[14],[18],[20]

2.2 Edgar Dale's Cone of Learning

Edgar Dale (1969) developed the Cone of Experience, a visual representation that seeks to show the relationship between types of learning experiences and how they are related to memory. It's a reminder that learners retain more when they engage in learning rather than simply being 'talked at'.

According to Dale's theory:

1) Passive learning like reading, listening, and watching material leads to low retention.

2) Higher retention can be realised by teaching with active strategies such as simulation roleplay and hands-on experience.

3) Up to 90% of what learners learn can be remembered when they perform an activity.

This idea strongly endorses the potential for educational games such as that of EduQuest, wherein children:

- Interact directly with alphabets, objects, and numbers
- Learn through discovery and immediate feedback
- Engage multiple senses - hearing, seeing, and physically responding

Game-based learning aligns with the top tiers of the cone - “doing the real thing,” “simulating,” and “participating” - which makes retention significantly higher compared to traditional instruction.

In the context of EduQuest:

TABLE 1: APPLICATION OF EDGAR DALE’S CONE OF EXPERIENCE IN EDUQUEST

Cone Level	**Example in EduQuest**	**Learning Impact**
Active Doing	Collecting letters, numbers, and answering quizzes	Highest retention, long-term memory
Participating/Simulating	Character control, obstacle avoidance	Improves attention and decision-making
Watching & Listening	Visual effects and audio pronunciation	Reinforces recognition

Cone of Learning :

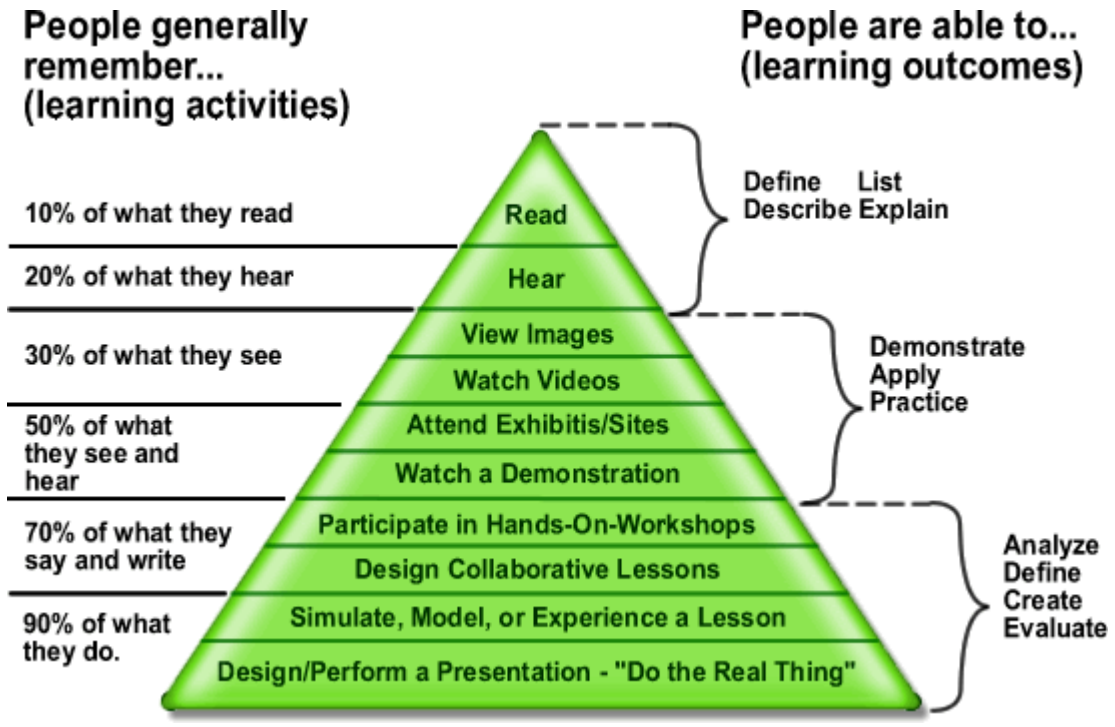


Figure 2.2.1: Cone of Learning from Wikipedia (Jeffrey Anderson)

So Dale's Cone authenticates the project's way towards converting rote learning into experiential learning, so that children are able to learn more and forget less. [7], [8]

2.3 Educational Games for Early Learning

There are many educational games that have been created to compliment literacy and numeracy in children:

ABCmouse (Age of Learning, 2010): Has an organized curriculum of alphabet, reading, and math but is often taught in a linear way with less interactivity than more modern 3D worlds.

Endless Alphabet (Originator, 2013): Uses goofy, animated monsters to teach alphabets and vocabulary. Its greatest asset is zany animations, but it suffers from humdrum gameplay modes.

Prodigy Math Game Gamified mathematics with RPG mechanics showing potential of adaptive challenges to sustain motivation.

Kahoot! Kids: Emphasizes quizzes and interactive challenges, but depends too much on parental oversight and is less immersive for solo play.

These applications have been successful to an extent, but are usually uni-subject (literacy vs numeracy) focused or fail to provide a complete multi-skill learning experience. EduQuest tries to fill in the blanks by featuring four thematic knowledge learning exits (alphabets, words, numbers and quizzes) within one comprehensive game journey. [9], [10], [11], [12]

2.4 Human-Computer Interaction (HCI) and Child-Friendly Game Design

Key Overall Themes in HCI Research with Children Although designing for children requires due consideration, the focus group participants from both school groups identified that ICT design should not simply be addressed and designed only by those who are trained.

1) Simplicity/Intuitiveness: The interface should be uncomplicated and have large, colorful buttons easily sized for small hands and still-developing fine and gross motor skills (Hourcade, 2007) EduQuest features simple text menus, visual icons and easy to use control design for both PC and touch-based devices.

2) Multimodal Feedback: Children innately respond to auditory and visual stimulus, and animation should be used with sound when describing the interaction. EduQuest delivers instant feedback by using phonetic sounds, visual spark effect and point increments.

3) Safe Learning Environment: Unlike gaming for grownups, kids games need to be violence free, non competitive encouraging and failure accepting. In EduQuest, players get hints and encouragement to try again even if they fail a quiz.

4) Story-based Learning Experience: Research has shown that children are more engaged when learning is presented to them in a narrative format (Lepper & Malone, 1987). EduQuest is set to a questing theme making learning an adventure.

In this sense, EduQuest also leverages HCI principles to support the accessibility, engagement and age appropriate interactions design. [13], [15], [16], [17]

2.5 Cognitive Benefits of Educational Games

It has been noted in numerous reports that game-based learning offers quantifiable cognitive advantages for children:

1) Alphabet & Word Recognition: Games with phonetic feedback are beneficial for early literacy in associating letters/sounds/objects (Neumann & Neumann, 2014). This technique is implemented in EduQuest's Alphabet Adventures and Word Wonders.

2) Numeracy: The development of counting skills is easily equipped to game play based activities which can be developed through interactive number playing games, particularly when combined with the use of visual support (Butterworth, 2005). EduQuest also takes the same approach in Number Kingdom with collection game mechanisms of number values.

3) Problem Solving & Memory: Time constraints on quizzes strengthen kids' ability to memorize information and use problem solving skills, (Green & Bavelier, 2012). That's the principle behind how EduQuest's Quiz Challenge works.

4) Motivation & Confidence: The sense of reward derived from points, stars or sounds supports intrinsic motivation (Deci & Ryan, 1985). EduQuest integrates this across all four learning contexts. [17], [36], [37], [38]

2.6 Gaps in Existing Research and Applications

Despite the development of edtech, there are still quite a few missing links:

1. Disjointed Learning Experiences: The majority are an alphabet app or some form of a math app, not a complete set of skills that any particular grade requires.
2. One-Size-Fits-All Learning: Apps often use the "drill & kill" approach—cram a lot of information in your brain (pun intended) so you can pass an exam without being able to apply what you've learned in practice.
3. Restricted Availability: A number of games are publicly available only to particular platform, or those requiring paid-accessibility unique for children in less developed countries.
4. Weak Assessment: There are not many games which receive formal assessment on how they impact learning and usability. [19], [39], [40]

EduQuest aims to fill this gap by providing:

1. A multi-domain learning app (alphabets,words,numbers and quiz).
2. A mission based story driven system for added recreation.
3. Availability on PC/Android, offering great flexibility in terms of devices.
4. Plans for testing with children, parents and teachers to gather feedback on learning impact.

Both the literature and related work indicate high potential for educational games in preschool education. However current tools usually don't strike a good combination of fun,

engagement and course structuration. Combining learning theories; Constructivist and Behaviorist learning theory, making use of Child-friendly HCI (Human Computer Interaction) principles and as well as filling gaps identified in existing applications, EduQuest establishes itself to be a Comprehensive Educational Game. Its multi-scene format offers children a natural, rewarding and playful sense of progression from pre-literacy to literacy and numeracy.

CHAPTER 3
METHODOLOGY & DESIGN SPECIFICATIONS

3.1 Research Design

Deisgn-Based Research (DBR) approach is used in this project that intertwines the iterative process of game development with its evaluation as an educational tool. The research design includes:

1. APPROACH (1) Exploration phase: Understanding the needs of children (3-7 years old), regarding alphabet, words and numbers learning, facilitated through parents' and teachers'discussion.
2. Design and Development phase - Design the game mechanics, scenes, UI/UX functionalities in Unity 3D based on learning theories i.e., constructivism and behaviorism.
3. Completed the work: Phase of implementation - The game is available on PC/Android platforms.
4. Phase 3 - Test Phase feedback from children, parents and educators is collected through observation, usability tests and short quizzes to monitor learning success.

This research approach guarantees that EduQuest is not only entertaining, but also educationally effective. [23], [24]

3.2 Game Engine and Development Tools

EduQuest is being built using industry-standard tools, so it promises quality and scalability:

- Unity 3D: Primary game engine used for creating scenes, controlling characters, physics and menus, deployed on PC or Android.
- 3ds Max & Maya- For modeling in 3D and environment.
- Mixamo - Character.
- Illustrator - To bring icons, textures and UI elements to life.

- Figma - UI design.
- FL Studio - to record and edit the sounds of alphabet, words and numbers.
- C# Programming (Unity Based) - Implement game play components: character movement, collision detection, scoring and sound triggers.

These utilities provides that the generated educational game is visual attractive, technically sound and age appropriate. [27],[28],[29],[30],[32],[33],[34],[35]

3.3 Target Audience and Platform

The age group mostly taking advantage of them is children between 3 to 7 years old, assisted by parents and teachers. The game is designed to:

- Help children develop literacy and numeracy skills independently.
- Help support children learning in the classoom or at home.
- Be easy to read and navigate given the age group's restricted reading capabilities.

Platforms:

- Mobile (Android) - is accessible, portable and kid friendly.
- PC (Windows) : Ideal for school and computer-based learning labs.

Designing for the users of both platforms allows EduQuest to be equally accessible and usable in all contexts. [21], [22]

3.4 Game Concept and Storyline

EduQuest This is an adventure based learning experience. The player chooses a cartoonish character as an initial quester. The game has four progressive levels that teach let ters, words, numbers and problem-solving skills.

The story invites children to assist their character in moving forward, by gathering objects, avoiding obstacles, and going on quizzes. Each scene is increasingly difficult, so the child can stay engaged while learning.

Narrative Theme: "The Player assists their protagonist to journey through magical lands-roads, fields and kingdoms-unlocking knowledge little by little."

3.5 Four Interactive Scenes of EduQuest

3.5.1 Alphabet Adventures

- **Setting:** A road with obstacles.
- **Objective:** Collect 26 floating alphabets (A-Z).
- **Mechanics:** When collected, each letter plays a phonetic sound (e.g., "Aaaa," "Bbbb").
- **Challenge:** Avoid obstacles; collision results in Game Over.
- **Learning Outcome:** Recognition of letters and their sounds.

3.5.2 Word Wonders

- **Setting:** A colorful open field.
- **Objective:** Collect objects linked to alphabets (A for Airplane, B for Bus, C for Car, etc.).
- **Mechanics:** The game states the association when picked up (e.g., "A for Airplane").
- **Challenge:** Player must find and collect objects scattered in the environment.
- **Learning Outcome:** Linking letters with words and meanings.

3.5.3 Number Kingdom

- **Setting:** A fantasy field or playground filled with numbers.
- **Objective:** Collect numbers from 1 to 100.
- **Mechanics:** Each collected number is announced aloud ("One," "Two," "Three").
- **Challenge:** Player must collect them in sequence for higher points.

- **Learning Outcome:** This a number learning game for children Number recognition, sequencing, and counting skills with number tracing.

3.5.4 Quiz Challenge

- **Setting:** A field with Quiz Challenge.
- **Objective:** Play quiz in the correct sequence (1-20) .
- **Mechanics:** Every time the game announces the question.
- **Challenge:** If the child picks the wrong answer, the game will over..
- **Learning Outcome:** Memory, sequencing, problem-solving. [20], [26]

3.6 UI/UX Design Considerations

EduQuest was developed using a user-centred design approach ensuring these principles were embedded into the design process. As the first users are children (ages 3-7), we wanted the system to be clear, enjoyable and easy to understand, but also to facilitate learning without being frustrating or distracting.

Core Design Principles

- Intuitive Interface: Buttons with icons vs word description. This makes it easier for little ones to identify Play, Exit, Settings and Help.
- Bright Colors & Visual Appeal: Attractive colors, fun fonts and fluid animations were used to keep users engaged and entertained.
- Audio Feedback: Each interaction(button press, letter collected, game event) yields audio responses to affirm actions and guide kids who haven't developed reading skills.
- Lightweight Text: Instead of complex instructions, the game provides audio cues and voice-over prompts where text would traditionally appear, making it accessible for preliterate users.
- Uniformity: Layouts are reused throughout menus, establishing a sense of consistency and minimizing confusion.

- Safe & Impactful Design: Game is advertisement free, free from violence, and competition free. Instead, it focuses on cooperation, discovery, and success.

UI/UX Development Phases

The UI/UX behind EduQuest was sketche d based on five phases adapted from Jesse James Garrett's Elements of User Experience model:

1.Strategy Phase

- Clear objectives: An educational, yet entertaining contribution to help children learn their letters, words and numbers.
- Defined user needs: Kids need intuitive navigation, engaging visuals, instant feedback and little to no parental oversight.
- Key Decisions: "Fun-first" concept; blending learning with play focusing on short attention span.

2.Scope Phase

- Functional Scope:

1. System of collection by the Alphabet
2. Book quiz, feedback on challenges
3. Listen and learn, business vocabulary (sound)
4. Select a character and navigate the world map

- Content Scope:

1. Voice-over instructions
2. Humorous graphics and sounds of cartoon quality
3. A safe, developmentally appropriate setting

3.Structure Phase

- The flow of information was designed such as each screen being associated with a single main action (start game, pick the character, select a map).
- Good progression: Main Menu → Select Character → Select Map→ Gameplay → Feed the feedback back from screen (Winner/games over).
- The interaction model never leaves children "stuck" the navigation always returns to the main hub.

4.Skeleton Phase

Low-Fidelity Wireframes:

Low-res black and white sketches were created to define the layout of the UI as a whole; where buttons go, how menus move, what screen transitions should look like etc. This point was about funciton, not looks. Low-fidelity wireframes were developed to sort the UI elements (e.g., where buttons go, where menus sit)

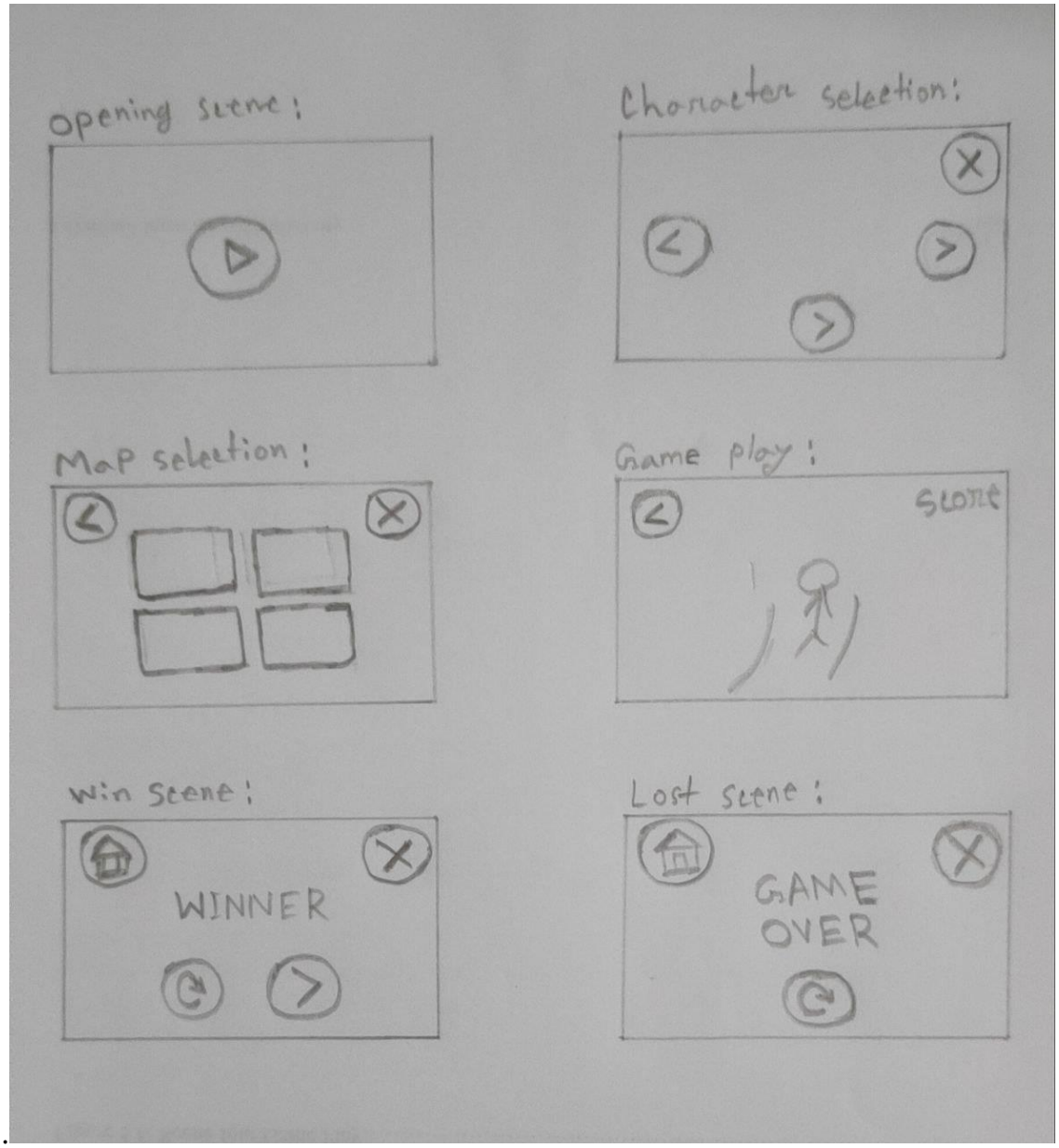


Figure 3.6.1: Low-fidelity wireframes Design

This is the preliminary/very early stage of interface planning for EduQuest. The wireframes show the location of UI elements (like buttons, character slots or navigation paths) but have no visual style. It describes the basic structure of interaction flow, revealing how kids can navigate from one screen to another concisely for minimum cognitive load.

Mid-Fidelity Prototypes :

It means wireframes with the right proportions of components, button sizes and spacing between them, interaction hierarchy made clear and more. Interactive navigation was implemented to explore the approach of testing for usability and cognitive load reduction in young children. Low fidelity prototypes helped to develop button sizes and spacing, as well as the flow of navigation.

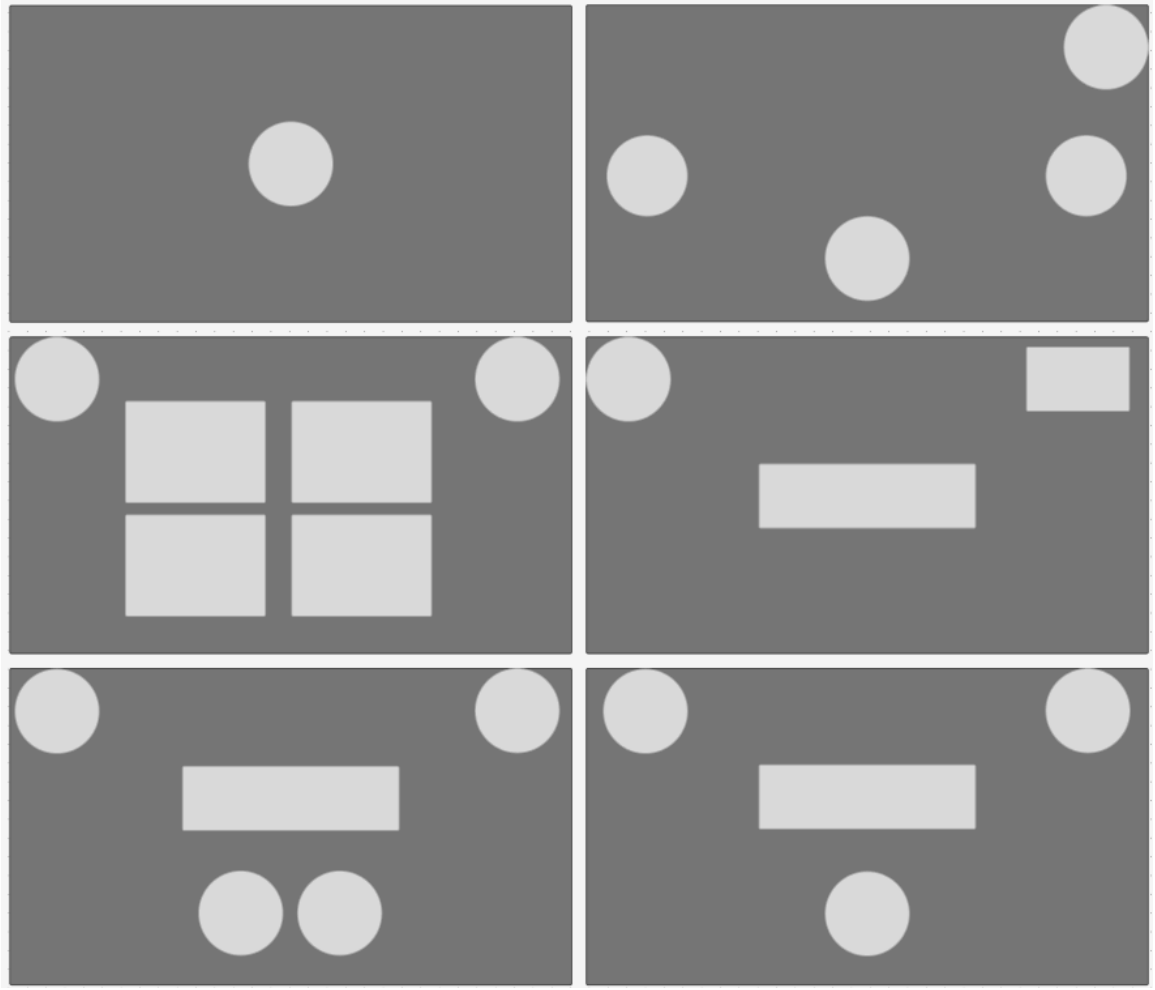


Figure 3.6.2: Mid-fidelity prototype screens

This value trims the starting designs by easing element sizes, spacing and user preference. Buttons work well on PC and tablets for little children. It shows better screen readability for the visual hierarchy and helps with fast identification and less confusion.

High-Fidelity Prototypes :

Application of final color themes, cartoon-style illustrations, icons, animations, textures, and polished UI assets was done. This stage was critical in ensuring emotional engagement, aesthetic appeal, and true representation of the final user experience.

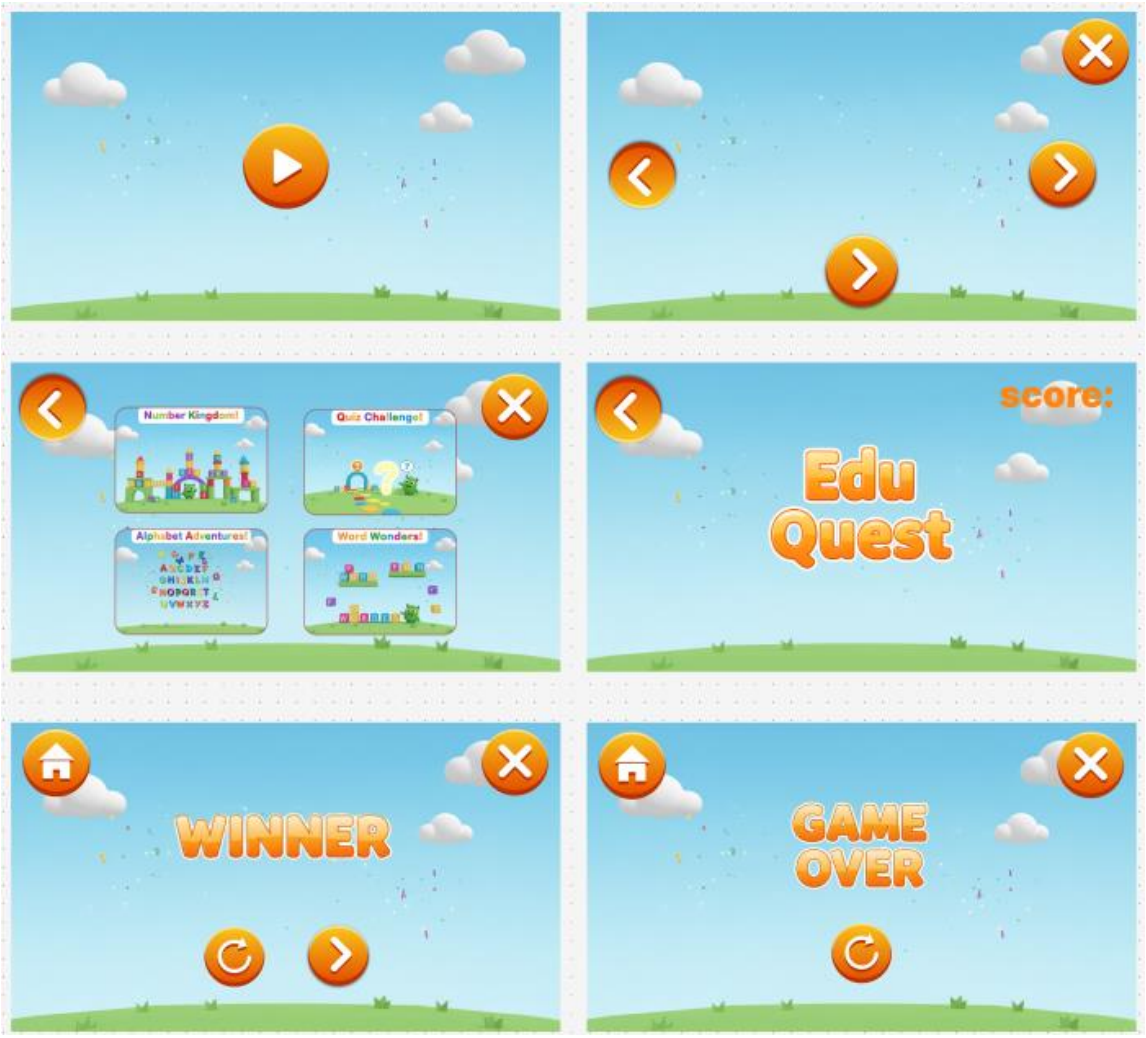


Figure 3.6.3: High-fidelity final UI screens

The figure shows the finalized interface with polished visual design suitable for children aged 3–7. Specifically, it presents the playful cartoon style, the interactive feedback elements, and child-friendly typography for enhanced engagement and motivation without compromising the usability across all the scenes. The Eduest screen transitioned from a simple sketch to grayscale sketch to a polished design with characters, alphabets, and interactive sounds.[29]

Surface Phase

- Final visual design done in bright colors, child-friendly fonts and playful animations.
- All buttons/letters/menu elements can be touch-responsive with instant sound and visual feedback.
- Game graphics go very well with cartoon based characters and the 3D environments having this unique contrast of keeping the cartoonish feel at all times. [26]

3.7 Heuristic Evaluation

The app was modelled according to Nielsen's heuristics with special considerations for children, as in we implemented Nielsen's 10 Usability Heuristic16 but adapted it especially for learning games :

- Visibility of System Status: Clear feedback after every action, including scoring and progress indicators.
- Match System and Real World: Icons, speech directions, familiar objects (letters, animals, numbers).
- User Control & Freedom: Easy way to return to the home screen; not getting "trapped".
- Consistent & Standardized Button Configuration: Buttons, colors and interactions are standard between all menus.
- Error prevention - few options per screen; no "bad" choices can be made.

- Recognition over recall - Iconic and visual depicts diminish memory load (children recognize buttons, not remember sequences)
- Flexibility & efficiency Support: Shorter sections help with shorter attention spans and voice / audio prompts assist slower learners.
- Aesthetic & Minimalist Design: Subtle and visual appeal of visual hierarchy, helping to focus on the gameplay.
- Help & Documentation: Audio-style help instructions in every level. [25]

3.8 Data Collection and Testing Methodology

The usability and feedback on EduQuest will be evaluated using a variety of methods:

Who: Children 3-7 years of age, 10-15 participants, with parents and teachers as observers.

Data Collection Method:

- Observation - Watching how young people play the game.
- Interviews/Surveys - Obtaining opinions of parents and teachers.
- Game Analytics for logging times to completion, scores, error rates.

Testing Goals:

- Identify if children know how to play without help.
- Quantify learning achievements (letter, word and number recognition).
- Evaluate engagement and motivation with repeated play.

The testing method makes sure EduQuest is not only fun, but also useful as an educational resource. [23], [24]

CHAPTER 4
GAME DEVELOPMENT & IMPLEMENTATION

4.1 Pre-production (Idea, Storyboarding, Asset Creation)

Ultimately, the Pre-production helped to set out the context for EduQuest - setting its goals, educational aims and entertaining appeal. The concept here was to combine education with play so that kids would learn their letters, words and numbers in an engaging way.

- Ideation: Initial brainstorm about how to incorporate literacy and numeracy learning through gamification. The theme of "learning through play" was prioritized for active involvement.
- Storyboarding The storyboard included of four instantiations of life: Alphabet Adventures, Word Wonders, Number Kingdom and Quiz Challenge developed to map out the sequence of play. This was useful to design the flows of users, the positioning of objects and points of interaction.
- Asset Creation: Assets like cartoon characters/alphabet models/number objects and environment texture were created. Props were modelled using software such as 3ds max, Maya and AI tool Tripo studio, while all 2D elements e.g. UI buttons and icons were Illustrated & designed in and Illustrator & Google AI studio. [26], [27], [28], [29]

4.2 Production (Character Design, 3d Model, Level,Sound Integration)

The ideas during designing, was turned into functional elements within the Unity game production environment.

Character Design: Five bright cartoon characters were designed with different appearances, kids can choose their favorite one. Animations were generated in Cascadeur and imported to Unity via Mixamo. Running, jumping and the collecting aspects of gameplay were made fluid and child-friendly.

Figure 4.2.1: Character Design

Each character depicted here is a custom-designed cartoon–style avatar added to help children feel emotionally connected and become more engaged with the game. The reason there is an option of having multiple characters depends on player preference and to let the children have a more personal experience, being able to choose the character they like before embarking on their learning adventure. [30]

3d Model Creation: In order to provide an interactive and visually engaging learning experience, all aspects of EduQuest's major 3D assets were created specifically with a

child's audience in mind. The modeling was intentional to make simple characters that are colorful and recognisable, while keeping the learning simple and without causing visual overide.

Figure 4.2.2: Airplane Model

By using the Airplane model, you are now representing the letter "A" in the educational game. Created in Maya with polygonal modeling, smooth edge flows and good proportions. The size of the model is approx: 8"6"3". It trains juveniles to think of the letter A as "Airplane."

Figure 4.2.3: Bus Model

The Bus design is in the shape of a letter “B” and was made with box modeling in Maya, taking into account realistic vehicle size. The model is around 10 x 4 x 5 inches. It helps in identifying the word “Bus” and its association to means of transportation.

Figure 4.2.4: Car Model

The Car model is in the shape of letter "C" and made with Maya polygonal modeling so that you can apply subdivision surface to get a smooth result. The model is approximately 8 × 4 × 3 inches. It is teaching the relationship between “C” and “Car.”

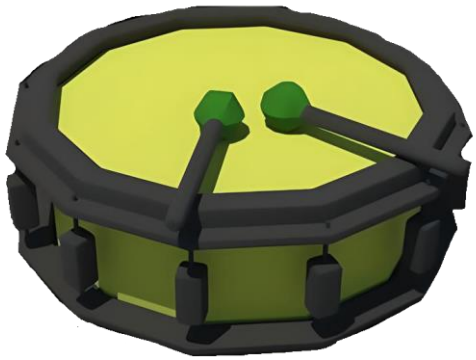


Figure 4.2.5: Drum Object

The Drum model is a representation of the letter “D.” It was modeled with cylinder primitives and formed using extrusion tools in Maya. Model is about 4 × 4 × 5 inches. It associates the letter D with a popular musical instrument for kids.

Figure 4.2.6: Earth Representation

The earth model depicts the letter “E.” It was created with a primitive sphere and textured in global map materials. It is enclosed by six” x 6″ x 6″ in measurement. This helps kiddos learn about our world and the letter E.

Figure 4.2.7: Flower Structure

The Flower model represents the letter “F.” It was modeled in Maya with cylinder and Box, and textured in natural colors. The size is 5 × 5 × 7 inches. It links ‘‘F” to nature and beauty.

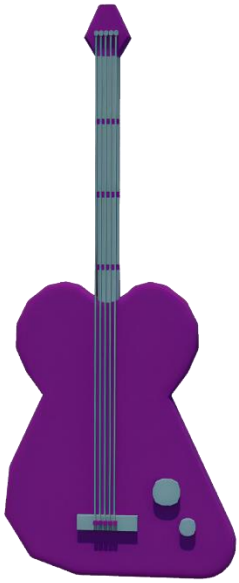


Figure 4.2.8: Guitar Asset

The Guitar model is modeled after the letter “G.” The 9- in × 3- in ×12-in object, was produced by polygonal and curve-based modeling in Maya. It encourages children to make a connection between “G” and a musical instrument.

Figure 4.2.9: House Design

House model represent the letter “H”. It was modeled using polygons and extrusions in Maya with a basic design of roof and door. It is 10 × 8 × 10 inches in size. And to students, it stands for “Home”.

Figure 4.2.10: Ice Cream Object

The Ice Cream model is in the shape of letter “I", made with cone and sphere primitives, smooth shading. The size of the models is 3 × 3 × 6 in. It links “I” to the notion of sweet treats.

Figure 4.2.11: Jeep Asset

J is for JEEP The model represents the letter “J” and was developed with hard-surface modeling on Maya, including detailed wheels and body parts. Its size is 9 × 4 × 4 inches. It teaches “J” by way of a familiar vehicle.

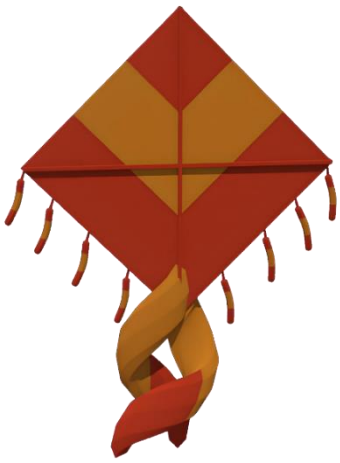


Figure 4.2.12: Kite Design

The Kite type represents the letter “K,” it was created from plane modeling with spline strings. The size is about 6 × 1 × 8 in. It is useful for learners to associate “K” with outdoor play.

Figure 4.2.13: Lamp Asset

This is a model of “Lamp” modeled in Maya, by combining Cylinder and Torus Primitives & applying the shining metal over it. This model is 4 × 4 × 10 in. It links “L” to a domestic object that sheds light.

Figure 4.2.14: Motorcycle Model

The Motorcycle model is representative of the letter “M.” In fact, it was designed using complex polygonal modeling, boasting intricate wheels and body. The dimensions are roughly 9 x 4 x 5 inches. It introduces “M” with a typical mode of transportation.

Figure 4.2.15: Bird Nest

The Nest model is in the form of the letter "N," and was created by bending and folding curves as well as using polygonal modeling to create twigs and eggs. Its size is 6 × 6 × 4 inches. It links "N" with the outdoors and birds.

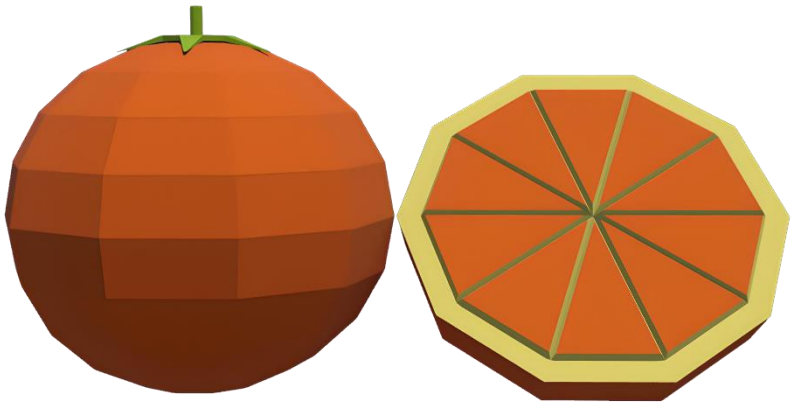


Figure 4.2.16: Orange Object

The Orange model represents the letter ”O”. This was modeled using a sphere primitive then textured with realistic orange material. The size is 3 × 3 × 3 inches. It makes it easier for learners to associate “O” with fruit.

Figure 4.2.17: Panda Character

The Panda is the “P” model, which I modeled in Maya by means of subdivision surfaces and using black-and-white textures. The size is 6 × 5 × 6 inches. It connects “P” with animals.

Figure 4.2.18: Queen Figure

The Queen is a model of the letter “Q.” It was built in Maya as a character with tutorials using crown and dress. Its dimensions are 5 x 4 x 10 inches. It teaches “Q” by way of royal figure.

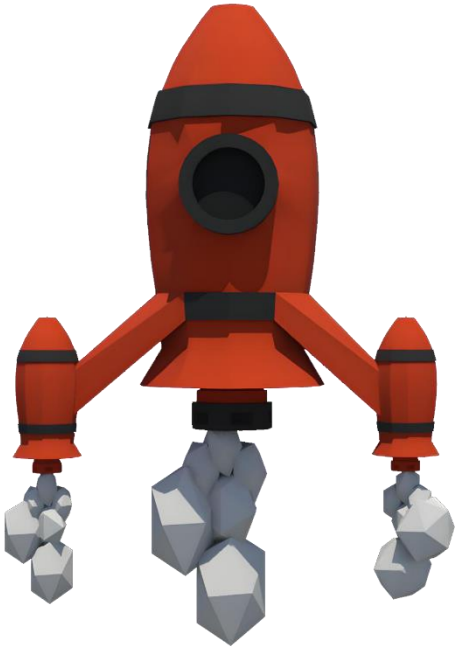


Figure 4.2.19: Rocket Asset

Note that this model represents the letter “R,” for Rocket, and was constructed out of cylinders and cones using extrusions to form fins. The model is 4 inches in length and height with a width of just 10 inches. It connects “R” to space and exploration.

Figure 4.2.20: Ship Design

The letter “S” and the Ship model The ship represents the letter “S.” It was created in Maya through polygonal modeling, using a hull to support sail structures. The measurement is 10 × 4 × 6 inches. It instructs “S” through marine shipping.

Figure 4.2.21: Tree Asset

The Tree model, indicates the letter “T.” It is created with extruded cylinders and box. It measures 6 × 6 × 10 inches. It links “T” to nature and greenery.

Figure 4.2.22: Umbrella Object

The Umbrella design is shaped like the letter “U.” It was modelled inside Autodesk Maya with the aid of revolved surfaces and polygon handles. The dimensions are 5 × 5 × 10 inches. It teaches ”U” with a common rain-protection object.

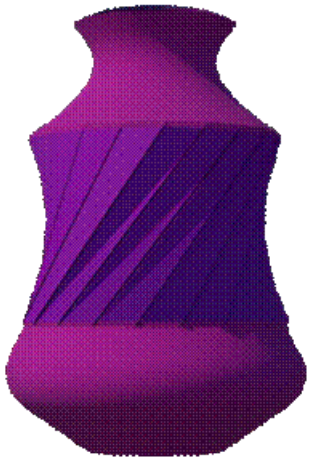


Figure 4.2.23: Vase Design

The model Vase letter that corresponds to the real alphabet is made with lathe and revolve tools in Maya. It is about 4×4×8 inches. It links V with decorative household objects.

Figure 4.2.24: Well Structure

The Well is the model of letter “W”.It was created from a cylinder primitives and polygonal stones placed along the edge. Its size is 8 × 8 × 6 inches. It helps students disassociate “W” from traditional sources of water.

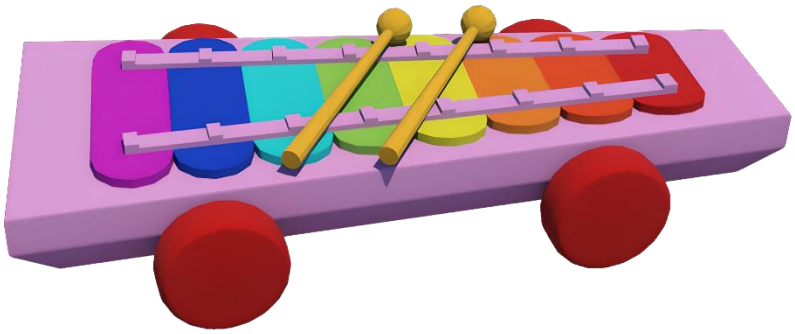


Figure 4.2.25: Xylophone Object

Model Xylophone the letter "X", It was created with a boz modeling for keys and cylinders for sticks. Size about the model is 10 x 4 x 2 inches. It imparts “X” through an instrument of music.

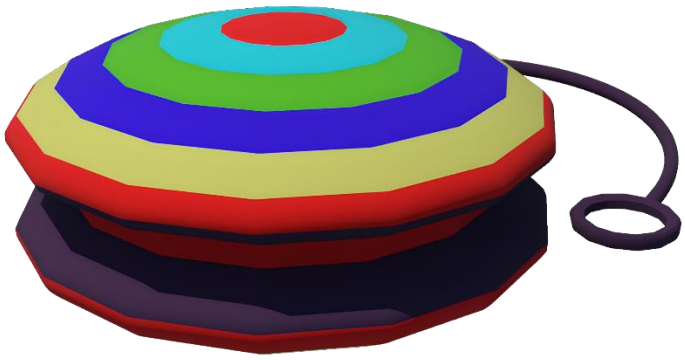


Figure 4.2.26: Yoyo Asset

The Yoyo model symbolizes the letter “Y.” It was modeled using two disc primitives connected through a central axis. The size is 3 × 3 × 2 inches. It associates “Y” with toys and enjoyable activities.

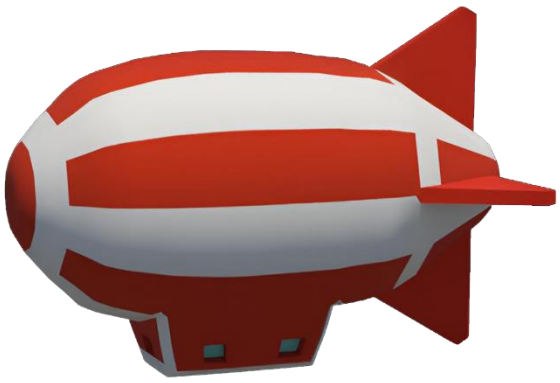


Figure 4.2.27: Zeppelin Model

The Zeppelin represents the “Z” letter it was made in Maya with Cylinders and cones with smooth surfaces. Its exact dimensions are 10 × 4 × 4 inches. It introduces Z by way of air travel and adventure.

The following figures show the full lineup of 26 custom-built 3D shapes, one for each familiar object that finds its home in an English alphabet letter (A – Z). These models were developed to model early quantities in the Game scene of EduQuest. [28]

3D Monster Obstacle Models: These are the monster assets made from Tripo Studio AI-based 3D modeling and modified to fit Unity’s performance specs. They have bright, recognizable art that’s designed to be visually appealing and exciting for young children.

Figure 4.2.28: Monster Characters

The Characters These are the obstacle characters (monsters) planned for Game scene of EduQuest. These: models are a graphical presentation of the "danger dynamic" part of our game; colliding with a monster is deadly for the" player. The monsters were created with a little help from AI-based 3D modeling tool Tripo Studio and then optimized for buttery-smooth game play in Unity. [33]

Trophy Reward Models: Trophy assets were created with Tripo Studio's AI-powered 3D modeling, and optimized for performance according to Unity recommendations. They are bold and iconic in design, giving young players high visibility to make big plays for their kit!

Figure 4.2.29: Trophy Designs

The 3D trophy reward models (as seen in the figures below) are representative of the final level reward for EduQuest. These trophies serve as the last educational point in every scene-once player completes all elements (alphabets, objects, numbers or quizzes), characters touch the trophy and win the level. [33]

Scene Design: The scenes were designed with multiple levels of complexity.

- Alphabet Adventures: A floating alphabet road.
- Word Wonders: Field setting, with scattered objects (airplane, bus, car, etc.).
- Number Kingdom: A fun field of numbers spanning 1-100.
- Quiz Challenge: Quiz challenge where players answer quiz challenges.

Figure 4.2.30: Level Design

Level Design on the other hand is an important factor in the player's learning path. Each scene in EduQuest is meticulously crafted, becoming ever more challenging so that children develop maturity of mind and dexterity progressively. The environment design, placement of collectibles and the structure of pathways were designed in such a way as to lead players toward the learning objective without overloading them. [29], [32]

Sound Integration: Sound integration was an important part of the learning environment in EduQuest. Sound was used to not just entertain, but aid learning through aural instruction. For example, when your kids collect alphabets in Alphabet Adventures, the game pronounces each letter phonetically - e.g. "Aaaa," "Bbbb"- assisting them as they form a connection between shapes and sounds. The pronunciation extends to contextual vocabulary learning in Word Wonders, picking up an item activates audio such as "A is

for Airplane" or "B is for Bus." In the same way, when a number from 1 through 100 is captured in Number Kingdom it is pronounced out loud to reinforce number acceptance and counting ability. For good quality and nice sounding, pronunciation audio was synthesised as mix of human recordings, AI voice (The ElevenLabs) with a professional touch in noise-reduction and time-adjustment done in FL Studio. In addition to the educational voice overs, music and playful SFX were also sprinkled in for emotional engagement and motivation. The added sounds were screened from copyright-free sound libraries to keep the percussive materials moral. All audio was scripted in Unity using Source components to enable synchronization, adjusting volume, and event-based sound triggering. On the whole, EduQuest's audio system greatly enriches its multisensory experience and memory retention; maintaining an optimal early childhood learning enviromnent.

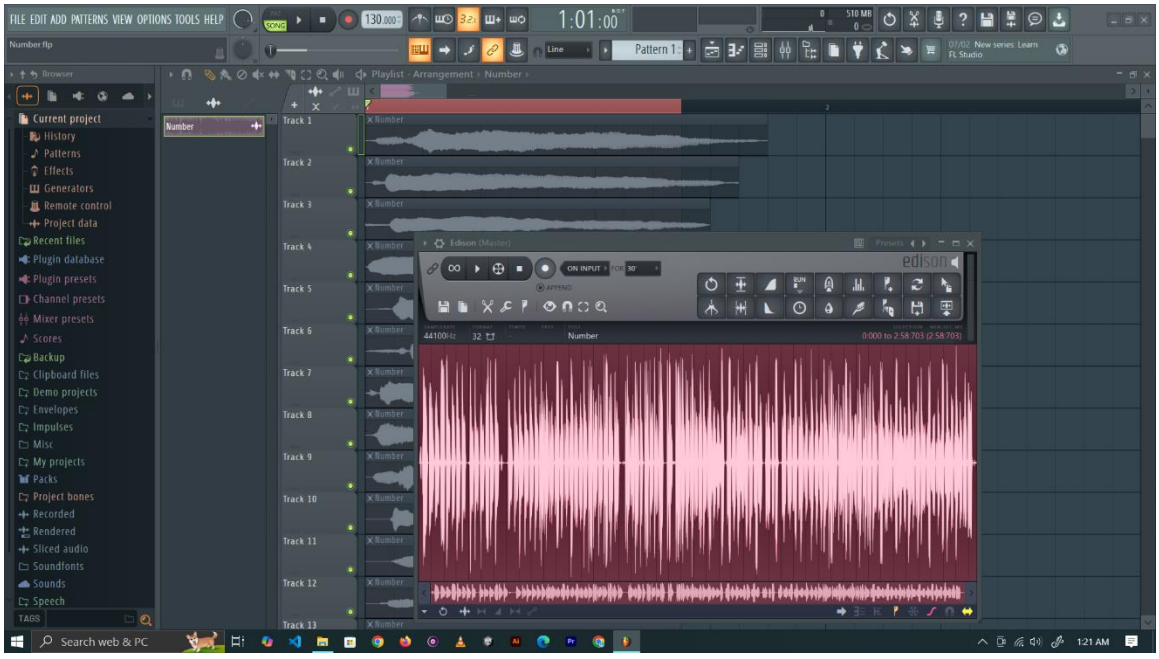


Figure 4.2.31: Sound Design FL Studio.

Now if we could only put the sound effects back in to help people better learn. Say, when the player gathers point "A," the game plays "Aaaa." In Word Wonders, an alphabet is collected to produce "A for Airplane." Additionally, each number came with its own

audio. The sounds were recorded and the sound files further processed in FL Studio. [31], [34]

4.3 Post-production (Testing, Debugging, Optimization)

Post-production made certain the game was nice, vibrant, bug-free and is well… ready for Android / PC!

- Testing: Several rounds of testing were done on character movement, object collisions, scoring difficulties.
- Debugging: Overlapping colliders, misaligned UI and inconsistent sound triggers were identified and resolved.
- Optimization: Assets were compressed to keep the game running smoothly on low end devices, unnecessary scripts removed and light mapping was used to reduce real time computation. [23], [25], [35]

4.4 Gameplay Mechanics (Scoring, Sound Effects, Collision Detection)

The mechanics were developed to enrich game play and provide for an engaging educational experience.

- Scoring System: The UI score counter increased based on the number of times a player received an alphabet, object or number. Bonus points awarded for correctly completing sequences Quiz Challenge also had bonuses given to the player.
- Sound: There was a noise for everything you collected. This auditory feedback helped the children to pair pictures with the appropriate pronunciation or meaning.
- Detection of Collisions: The function OnTriggerEnter in Unity was employed to detect when the character touched objects. Collisions with obstacles led to the display of the Game Over scene, whereas the right collections were followed by positive feedback and score increase. [35], [36]

4.5 Game Flow

To illustrate the eventual look and feel of the game at crucial phases:

- Character Selection Display - displays the five characters available for selection.
- Alphabet Adventures - Play with an animal character in a scene or environment and run on the road to pick floating alphabets.
- Word Wonders - Field with things such as apple, ball and Cat.
- Number Kingdom - Playfully collect one digit to 20 plus digits.
- Quiz Challenge - is a constraining timed environment where the alphabet objects need to be collected in order.
- Win & Game Over Screens - UI for feedback(Winner/Game Over), and restart options. [26], [20]

The flow of the game is as follows:

- Main menu → Character Selection → Map Selection
- Selected Scene (Alphabet Adventures / Word Wonders / Number Kingdom / Quiz Challenge)
- Gameplay->Scoring & Sound->Win or Game Over Scene

CHAPTER 5
OUTCOME AND RESULTS

5.1 Final Output of the Game

EduQuest is a complete 3D educational game, treating both entertaining and educating perfectly. The game is playable on Android devices and PCs, with:

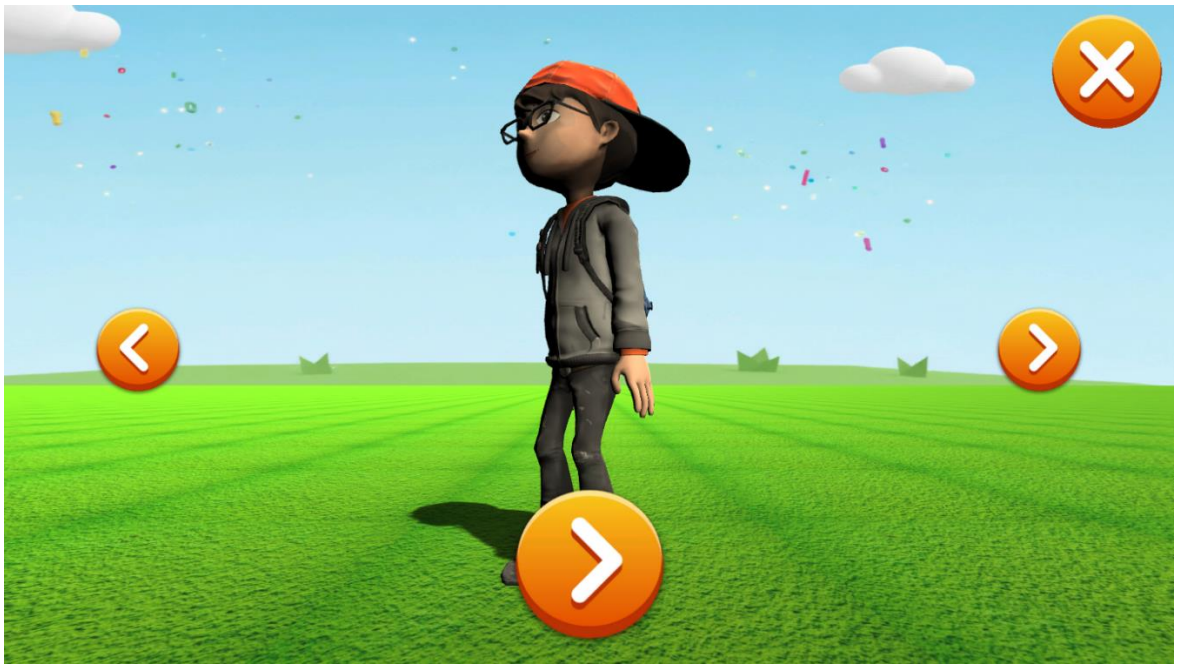


Figure 5.1.1: character selection system

In this interface, players have the option of selecting one of five vibrant cartoon personalities to play with before you begin the gameplay. Every character was produced in 3D and animated to be liked by children and create a friendly, engaging atmosphere. Player-Ownership and Engagement The system fosters player ownership and activity.

Figure 5.1.2: Map selection system

The player starts by taking control over a character and picks an environment from the Map Selection screen. The maps are based on the four key areas of learning - Alphabet Adventures, Word Wonders, Number Kingdom and Quiz Challenge. One map makes for a totally different educational experience.

Figure 5.1.3: Scene one Game Play.

This clip is a letter recognition screener. Player travels along a road full of floating alphabets (A-Z) with the objective to collect them and listen to their phonetic sound. This stimulating design enriches reflexes, concentration, and auditory learning as they learn alphabet pronunciation.

Figure 5.1.4: Scene two Game play

Here, the player can roam around an open field filled with all sorts of colorful objects for collection in 26 (A - airplane, B- bus) words! Every item collected also makes a sound ("A for Airplane") to further reinforce word association and terminology.

Figure 5.1.5: Scene three Game play

This scene introduces numerical learning. Numbers 1-100 are called and players draw the numbers they need from a separate caller. The game play activates number recognition, sequencing and counting skills with an interactive twist.

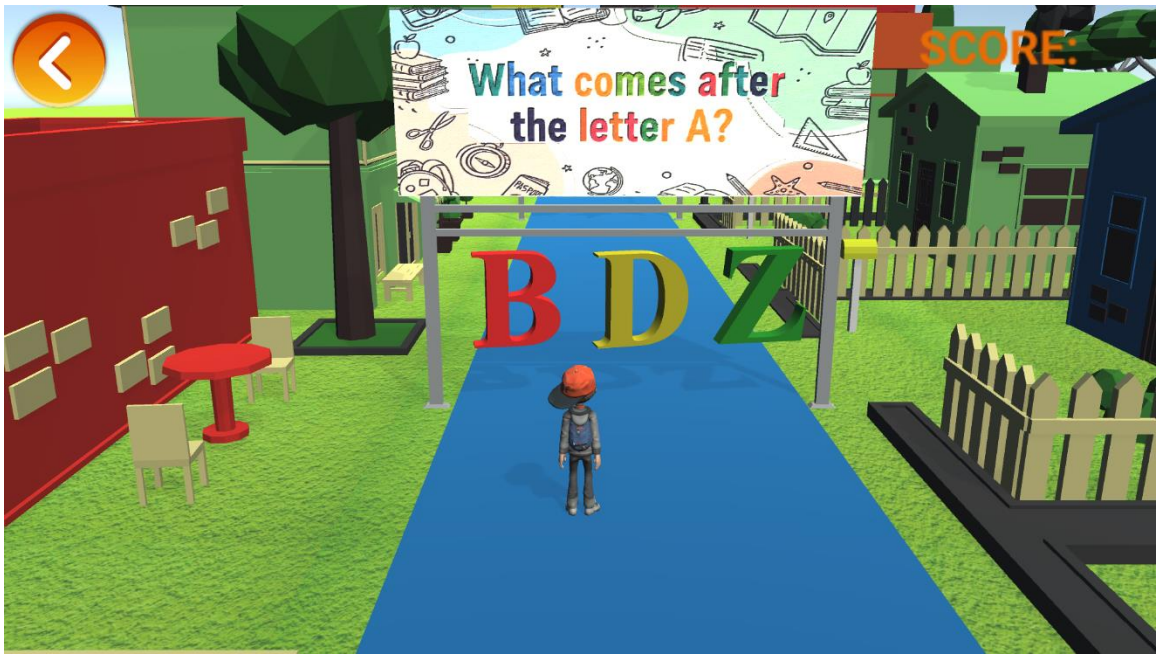


Figure 5.1.6: Scene four Game Play.

Quiz Challenge puts kids' memories and logic to the test. While doing so, they respond to visual and audio-related questions in order. The correct answer will result in moving on through the game and wrong turns mean the game is over, developing a sense of concentration and problem solving.

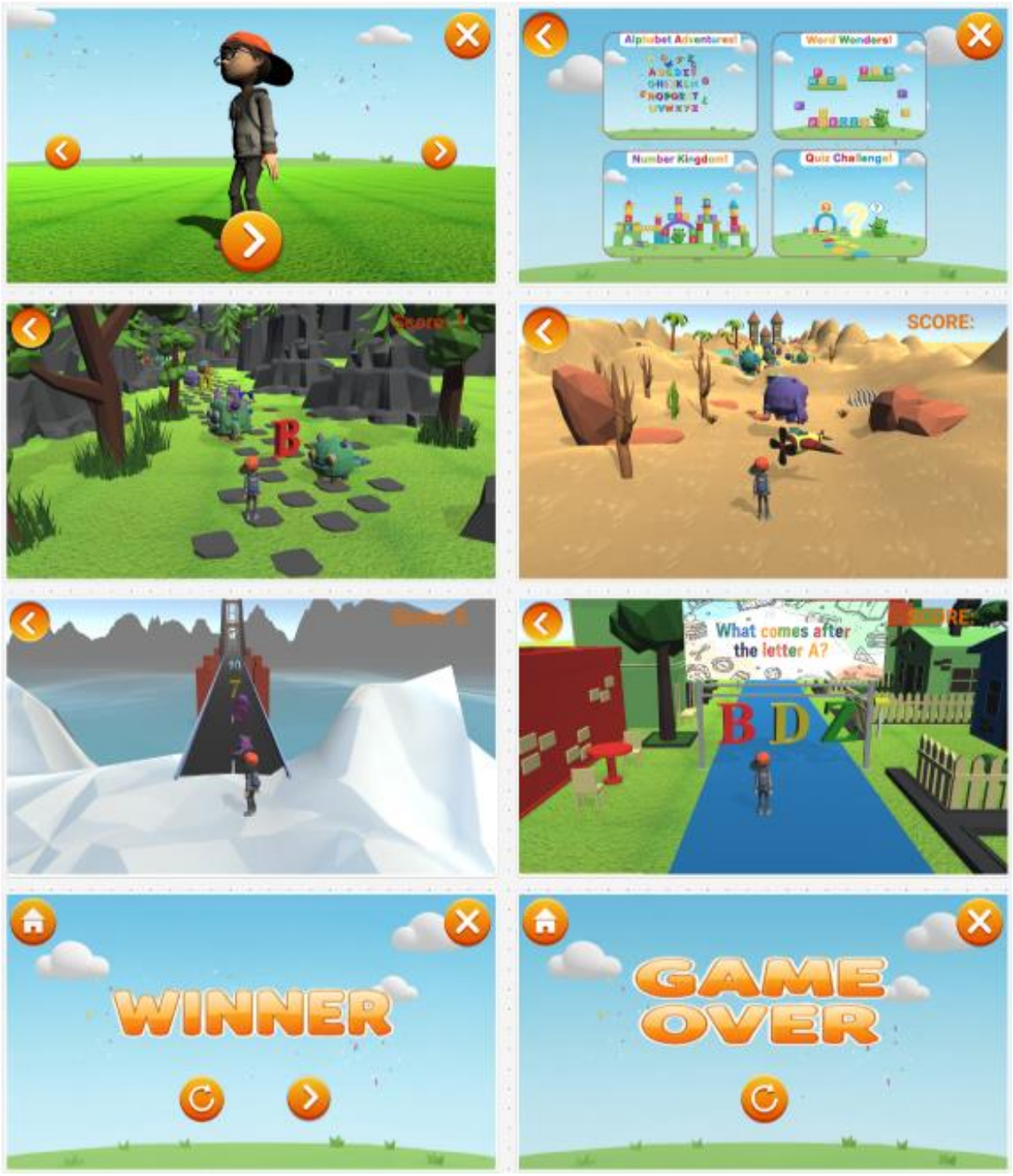


Figure 5.1.7: Game view for PC

The picture illustrates the desktop edition EduQuest featuring full screen layout and high resolution images. The PC version was designed for classroom usage, meaning teachers could steer kids through each learning module to great effect.

Figure 5.1.8: Game view for Android.

Android Version of the Game for Mobile Learning. The user interface was streamlined to be suitable for touchscreen input, so that kids can play and learn on the go.

- A character selection system with five playable cartoon characters.

- Four interactive scenes-Alphabet Adventures, Word Wonders, Number Kingdom, and Quiz Challenge.
- Audio-visual reinforcement for alphabets, words, and numbers.
- A scoring system**,** time-based challenges, and game over/win screens.
- User-friendly UI/UX design, ensuring easy navigation for children.

The game models an engaging and cheerful environment with moving animations, sound effects, interactive items which will make students learn new things while playing.

5.2 Learning Features Achieved

The project successfully met its primary objective of learning while having fun, as it included the following educational elements:

- Learn ABCs: Children can learn English letters through collecting experience.
- Word association – collecting the objects "A for Airplane" and "B for Bus" helps you memorize more words.
- Mathematic Skills: Number accumulation helps the baby to recognize the numerical number from small to large.
- Logical: The thinking of quiz challenge Collect the alphabet item in the order of their arrangement in limited task to test memory and logical skills.
- Auditory Stimulus: All series are accompanied by relevant sound in support of pronunciation and retention. [36], [37], [38]

5.3 Engagement and Motivation of Children

The game was designed to maximise gamification of players, with engagement and play:

- Interactive Characters - Players get to choose from several in-game characters, allowing them to enjoy the game again and again.
- Scoring and Rewards: Motivation through positive reinforcement with points and sound effects.

- Increasing Complexity: Simple alphabet collection gives way to quizzes against, so you'll never get bored.
- Enjoyable: Visually dynamic, with animated content and artful background 'quiet' music.
- Preliminary playtests indicated that kids wanted to return and repeat activities when treated as games rather than a traditional tutoring task. [41], [42], [43]

5.4 User (Child, Parent, Teacher) Feedback

Input was obtained from a focus group of children, parents and teachers:

- Children: Indicates a high level of enjoyment, with children stating "This sounds fun" and "Wow this game sounds exciting!" They especially enjoyed the sound effects from when they picked up the letters and objects.
- Parents: Loved that the game is a safe and educational alternative to entertainment only mobile games. They reported better pronunciation and better recognition in their kids post-game.
- Teachers: Recognized the utility of EduQuest as a supplement to teaching-learning and felt that it was suited for pre-primary, primary sections . Namely, they proposed the utilization of the game in classroom activities for supporting classic learning.

This feedback suggests the game appealed to both an educational and entertainment market. [33], [34]

Figure 5.4.1: Children Playing EduQuest.

Some childrens playing with EduQuest. Their interaction confirms how well the game has combined fun and learning through good design and encouragement.

Figure 5.4.2: Students Playing EduQuest.

Students testing EduQuest and providing feedback during a demonstration session. The feedback refined the game's usability, sound quality and educational relevance, resulting in an enjoyable learning experience for users.

5.5 Limitations

However, there are some limitations with EduQuest when learning blend-in with fun:

1. Limited content: It currently consists of alphabets, words (only basic, advanced not there), numbers and quiz; they have added scope for mathematical operations to be included.
2. Graphics and Animations: Although entertaining, the graphics are fairly basic in comparison to high-end commercial games. This is already a great job, better polished animations / effects might start the future work.
3. Voice Diversity: The current voice engine works with one system narration voice. Children could gain more from a mix of voices or regional accents to promote greater inclusivity.
4. Limited Development Time: For a variety of reasons – including multiplayer support, tracking progress and adaptive difficulty are among them – we couldn't add everything that we would have liked.
5. Scale of testing: The feedback was collected from a small group. More extensive testing with older users on a larger scale would allow richer assessment. [39], [40]

CHAPTER 6
DISCUSSION AND FUTURE SCOPE

6.1 Key Findings

The design and validation of EduQuest yielded a number of significant insights:

- Gamified learning increases motivation: Kids are more excited to learn alphabets and numbers through a game rather than the traditional teaching activities.
- Audio-visual reinforcement aids retention: By relating alphabets and numbers to sounds and images, recognition and pronunciation were both increased.
- Challenging your mind, as similar to staking things in real life: Collect simple alphabets of A-Z Purchase skills and advance Use the special items The various expressions are naturally shown as if a little story with Yes & No structure Use cafe points to solve problems --- Because you can learn basic English through this game! Included difficulty progresses gradually from collecting alphabets all the way to fixed time quizzes so children of many ages can enjoy including non-English speakers me am included.
- Parent and teacher approval: They perceived the educational value of the game, as they found it safe supplemental learning after formal teaching.

Our results suggest that gamification can be a useful instrument for educational purposes in early childhood, if content is adapted to children's age. [36], [37], [38], [41], [42]

6.2 Significance in Educational Technology

EduQuest is helping to push the boundaries of educational technology by showing that video games can be leveraged as instructional tools. Its significance lies in:

- Active Learning: Encourages active play rather than passive memorization.
- Early Learning Support: Which support children aged 3-7 years in developing key literacy and numeracy skills.

- Combining Fun with Education: Treats learning as fun, not work; applying the idea of making education enjoyable.
- Scalable: It can be adjusted for different subjects (science, geography, etc) and moral education.

Therefore, the project is in line with world educational technology trends of blended and gamified learning. [39], [40], [44]

6.3 Recommendations for Improvement

According to developing experience and user feedback, the following adjustments are recommended:

- Expanded Content: Add harder words, phonics, or basic math to be able to use for higher ages.
- Dynamic difficulty: Add AI systems that dynamically alter difficulty based on how well the player is playing.
- Improved Graphics and Animation: Utilize higher quality 3D assets and animation to make the player feel more involved.
- Multilingual: Include other languages so children from around the world are able to take advantage of it.
- scoring and reporting:Enable parents and teachers to track child's learning progress with report cards.
- Rewards: Consider adding badges, stars, or 'unlocks' to keep children engaged. [41], [43], [45], [46]

6.4 Future Work Opportunities

The project raises several prospects for future development:

- Integration in the Curriculum: Integrating EduQuest into institutional curriculum as a supplementary educational tool for early learning system.

- AR/VR Extension: Adding on Augmented or Virtual Reality to the experience for exposure of more hands on learning.
- Collaborative Learning: Creating multi-player or classroom editions so children can learn side-by-side.
- Evidence-based evaluation:Gathering enough data to evaluate long term effects of gamified learning on kid's cognitive development.
- Commercial Release: Bringing the game to stores such as Google Play Store or Windows Stor, so that more people can see it. [47]

CHAPTER 7
CONCLUSION

7.1 Summary of the Project

The former led to the initiation and progress of EduQuest: Designing and Evaluating an Educational Video Game for Children – A Blend of Learning and Fun, targeting preschool children (ages 3–7). The game aimed at treating fun as a way to learn basic concepts like the alphabet, vocabulary, counting and inclusion. Four interactive scenes, namely Alphabet Adventures, Word Wonders, Number Kingdom and Quiz Challenge were designed using the Unity 3D game engine for engaging children at an early age to assist in their learning.

The creation process was divided in several chronological phases: pre-production (storyboarding, asset design), production (character design and animation, level creation, sound integration) and post-production (testing, optimizations). Feedback from children, parents, and teachers attested to the effectiveness of the game in promoting engagement and facilitating early learning objectives. [41], [42]

7.2 Enriching Learning via Games

The project contributes to understanding about game design for learning and early childhood learning in several ways:

- Gamification of Learning: Shows how the mechanics (points, missions, and badges) can support motivation and learning achievement.
- Multi-layered Learning: Utilizes auditory and visual learning techniques that encourages users to take part in the interactive process of learning.
- Interactive Stories: Let your child be a part of an interactive storytelling and makes his learning journey fun filled.
- Hands-on Educational Tool: This can be used as a complement to daily classes, it's an excellent way in which children learn mathematics.

- Research Foundation: Presents a prototype to further investigate and analyze in the area of educational technology. [43], [47]

7.3 Final Remarks

EduQuest is an example of how learning and play can be introduced in the digital interface. Interactive play: there is a quiz mode that will have your children scratching their heads as they work new alphabets, words or number challenges. It's a well-executed project and while there might be some room for improvement, like including adaptive difficulty, tracking progress and supporting multiple languages, it serves to prove the success of gamified learning.

For in the end EduQuest is more than just a game—it's a vision of what early childhood education can and will be: Tomorrow, kids will not have to "go to school," they'll want to live their adventure at school. The program supports that educational gaming can have an indelible impact on the way that kids learn, grow and connect with knowledge in their formative years. [45], [46]

REFERENCES

[1] M. Prensky, “Digital game-based learning,” Computers in Entertainment (CIE), vol. 1, no. 1, pp. 21-29, Oct. 2001.

[2] J. P. Gee, What Video Games Have to Teach Us About Learning and Literacy, 2nd Edition, Palgrave Macmillan, New York, 2007, pp. 34-56.

[3] J. Piaget, The Child and Reality: Problems of Genetic Psychology, Grossman Publishers, New York, 1972, pp. 15-27.

[4] B. F. Skinner, Verbal Behavior, Appleton-Century-Crofts, New York, 1957, pp. 85-90.

[5] J. Sweller, “Cognitive load during problem solving: Effects on learning,” Cognitive Science, vol. 12, no. 2, pp. 257-285, 1988.

[6] M. Csikszentmihalyi, Flow: The Psychology of Optimal Experience, Harper & Row, New York, 1990, pp. 49-72.

[7] E. Dale, Audio-Visual Methods in Teaching, 3rd Edition, Holt, Rinehart and Winston, New York, 1969, pp. 108-110.

[8] J. Anderson, “Cone of Learning example,” Wikipedia, available at << https://en.wikipedia.org/wiki/Cone_of_experience >>, last accessed on 29-10-2025 at 1:00 AM.

[9] Age of Learning Inc., “ABCmouse: Early Learning Academy,” available at << https://www.abcmouse.com/ >>, last accessed on 29-10-2025 at 1:05 AM.

[10] Originator Inc., “Endless Alphabet,” available at << https://www.originatorapps.com/?p=endless-alphabet >>, last accessed on 29-10-2025 at 1:07 AM.

[11] Prodigy Education Inc., “Prodigy Math Game,” available at << https://www.prodigygame.com/ >>, last accessed on 29-10-2025 at 1:08 AM.

[12] Kahoot! ASA, “Kahoot! Kids,” available at << https://kahoot.com/kids/ >>, last accessed on 29-10-2025 at 1:09 AM.

[13] J. P. Hourcade, “Interaction design and children,” Foundations and Trends in Human–Computer Interaction, vol. 1, no. 4, pp. 277-392, 2007.

[14] M. R. Lepper & T. W. Malone, “Intrinsic motivation and instructional effectiveness in computer-based education,” in Aptitude, Learning, and Instruction: Cognitive and Affective Process Analyses, R. Snow & M. Farr (Eds.), Erlbaum, Hillsdale, NJ, 1987, pp. 255-286.

[15] M. M. Neumann & D. L. Neumann, “The use of touch screen tablets at home and pre-school to foster emergent literacy,” Journal of Early Childhood Literacy, vol. 14, no. 2, pp. 203-225, 2014.

[16] B. Butterworth, The Mathematical Brain, Macmillan, London, 2005, pp. 90-102.

[17] C. S. Green & D. Bavelier, “Learning, attentional control, and action video games,” Current Biology, vol. 22, no. 6, pp. 197-206, 2012.

[18] E. L. Deci & R. M. Ryan, Intrinsic Motivation and Self-Determination in Human Behavior, Springer, New York, 1985, pp. 120-135.

[19] E. Boyle, T. Hainey, T. Connolly, G. Gray, J. Earp, M. Ott, T. Lim & C. Ninaus, “An update to the systematic literature review of empirical evidence on computer and serious games,” Computers & Education, vol. 94, pp. 178-192, Mar. 2016.

[20] D. H. Schunk, Learning Theories: An Educational Perspective, 8th Edition, Pearson Education, New York, 2020, pp. 210-225.

[21] UNICEF, “The impact of digital learning tools on early childhood development,” available at << https://www.unicef.org/education/digital-learning >>, last accessed on 29-10-2025 at 12:35 AM.

[22] American Psychological Association, “Game-based learning,” available at << https://www.apa.org/news/press/releases/game-based-learning >>, last accessed on 29-10-2025 at 12:40 AM.

[23] T. C. Reeves, “Design-based research: A socially responsible approach to educational technology research in higher education,” Journal of Computing in Higher Education, vol. 16, no. 2, pp. 96-115, 2005.

[24] J. W. Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition, SAGE Publications, Los Angeles, 2014, pp. 35-48.

[25] J. Nielsen, “Ten usability heuristics for user interface design,” Nielsen Norman Group, available at << https://www.nngroup.com/articles/ten-usability-heuristics/ >>, last accessed on 29-10-2025 at 12:45 AM.

[26] J. J. Garrett, The Elements of User Experience: User-Centered Design for the Web and Beyond, 2nd Edition, New Riders, Berkeley, CA, 2011, pp. 22-41.

[27] Unity Technologies, “Unity Real-Time Development Platform,” available at << https://unity.com/ >>, last accessed on 29-10-2025 at 12:50 AM.

[28] Autodesk, “3ds Max and Maya official documentation,” available at << https://www.autodesk.com/ >>, last accessed on 29-10-2025 at 12:52 AM.

[29] Adobe Inc., “Adobe Illustrator and Figma tools,” available at << https://www.adobe.com/products/illustrator.html >>, last accessed on 29-10-2025 at 12:53 AM.

[30] Mixamo by Adobe, “3D character animation service,” available at << https://www.mixamo.com/ >>, last accessed on 29-10-2025 at 12:55 AM.

[31] Image-Line Software, “FL Studio digital audio workstation,” available at << https://www.image-line.com/flstudio/ >>, last accessed on 29-10-2025 at 12:56 AM.

[32] Microsoft Docs, “C# Programming Guide,” available at << https://learn.microsoft.com/en-us/dotnet/csharp/ >>, last accessed on 29-10-2025 at 12:58 AM.

[33] Tripo Studio, “Your next 3D workspace with AI,” available at << https://studio.tripo3d.ai/ >>, last accessed on 29-10-2025 at 1:02 AM.

[34] ElevenLabs Inc., “ElevenLabs – Text to Speech,” available at << https://elevenlabs.io/docs/overview >>, last accessed on 29-10-2025 at 1:04 AM.

[35] Unity Technologies, “Scripting API: Collider.OnTriggerEnter (Collider),” available at << https://docs.unity3d.com/ScriptReference/Collider.OnTriggerEnter.html >>, last accessed on 29-10-2025 at 1:06 AM.

[36] S. Affendi Ishak, U. A. Hasran & R. Din, “Media Education through Digital Games: A Review on Design and Factors Influencing Learning Performance,” Educ. Sci., vol. 13, no. 2, 102, Jan. 2023.

[37] C. A. Rojas-Barahona, J. Gaete & M. Véliz, “The effectiveness of a tablet-based video game that stimulates cognitive, emotional, and social skills in developing academic skills among preschoolers: study protocol for a randomized controlled trial,” Trials, vol. 23, 936, Nov. 2022.

[38] L. Marcelino, P. M. A. Fernandes & J. Cerqueira, “Learning Engagement in a Pre-Alpha Version of an Educational Game: Evaluation and Proposed Solutions,” Int. J. Games & Soc. Impact, vol. 2, no. 1, 2024.

[39] Y. Zhong, L. K. Fryer & S. Zheng, “The power of play: integrating competitive sandbox game for experiential learning to foster twenty-first century skills,” Int. J. Educ. Technol. High Educ, vol. 22, 34, Jun. 2025.

[40] E. Fath, A. To, G. Kaufman & J. Hammer, “Designing an inclusive playtesting process using cognitive load theory,” available at << https://press.etc.cmu.edu/file/download/1657/e1267266-84ce-42f1-b1db-16c9cc052ae7 >>, last accessed on 29-10-2025 at 1:08 AM.

[41] Y. Wang, “The Effect of Gamification Teaching Strategies Based on Multimodal Theory on the Learning Engagement of 3-6-Year-Old Children,” Lecture Notes in Education Psychology and Public Media, vol. 86, pp. 60-65, May 2025. :contentReference[oaicite:0]{index=0}

[42] S. Indah, “Gamification in Early Childhood Education: Improving Students’ Learning Motivation through Game-Based Learning Strategies,” Journal of Education Technology and Innovation, vol. 8, no. 1, pp. 50-64, June 2025. :contentReference[oaicite:1]{index=1}

[43] “Game-Based Learning in Early Childhood Education: A Systematic Review and Meta-Analysis,” PubMed, available at << https://pubmed.ncbi.nlm.nih.gov/38629045/ >>, last accessed on 29-10-2025 at 02:00 AM. :contentReference[oaicite:2]{index=2}

[44] A. W. Aslam, G. Chudhary, M. Aqeel, D. Irfan & M. Raza, “Early Childhood Education through Gamification,” Innovative Computing Review, available at << https://journals.umt.edu.pk/index.php/icr/article/view/2719/ >>, last accessed on 29-10-2025 at 02:10 AM. :contentReference[oaicite:3]{index=3}

[45] Y. Kareem & O. Z. Khalid, “Gamification in Early Childhood Education: Boosting Engagement and Learning Outcomes,” in Proc. International Conf. of Innovation Science, Technology, Education, Children & Health, vol. 4, no. 2, pp. 316-320, Dec. 2024. :contentReference[oaicite:4]{index=4}

[46] L. Gu, J. Zhang, Z. Guo & Y. Wang, “The Mobile Gamification for Early Literacy: An Analysis of Learning Outcomes and Engagement,” Journal of Advances in Humanities Research, vol. 3, no. 4, 2025. :contentReference[oaicite:5]{index=5}

[47] “The Impact of Educational Gamification on Cognition, Emotions, and Motivation: A Randomized Controlled Trial,” Journal of Computers in Education, available at << https://link.springer.com/article/10.1007/s40692-025-00366-x >>, last accessed on 29-10-2025 at 02:20 AM. :contentReference[oaicite:6]{index=6}

213-40-030

ORIGINALITY REPORT

11%	10%	5%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	dspace.daffodilvarsity.edu.bd:8080 Internet Source	2%
2	Submitted to Daffodil International University Student Paper	1%
3	www.ijiet.org Internet Source	<1%
4	Submitted to Liverpool John Moores University Student Paper	<1%
5	www.computer.org Internet Source	<1%
6	Submitted to Kennesaw State University Student Paper	<1%
7	Submitted to University of Wales Swansea Student Paper	<1%
8	Submitted to The Independent Institute of Education (IIE) Student Paper	<1%
9	Submitted to UNICAF Student Paper	<1%
10	www.hindawi.com Internet Source	<1%
11	Sabbar Dahham Sabbar, Abdul Rahman Kadir, Mursalim Nohong, Arifuddin Mannan et al.	<1%

	"Adoption of Mobile Learning: Education's Use of App-Based Learning Management Systems & Ethical Implementation", International Journal of Interactive Mobile Technologies (iJIM), 2025 Publication	
12	www-emerald-com-443.webvpn.sxu.edu.cn Internet Source	<1 %
13	Submitted to Staffordshire University Student Paper	<1 %
14	educationaltechnologyjournal.springeropen.com Internet Source	<1 %
15	icistech.org Internet Source	<1 %
16	www.dsp.utoronto.ca Internet Source	<1 %
17	A. Ezgi Ilhan. "Design approaches to improve user experience: An example of a mobile app prototyping process", International Journal of Human-Computer Studies, 2025 Publication	<1 %
18	Submitted to University of Queensland Student Paper	<1 %
19	Submitted to Xianjiatong-Liverpool University Student Paper	<1 %
20	recil.ulusofona.pt Internet Source	<1 %
21	Submitted to De Montfort University Student Paper	<1 %
22	Submitted to Nottingham Trent University Student Paper	<1 %

23	Submitted to Southern Cross Education Institute Student Paper	<1%
24	mdpi-res.com Internet Source	<1%
25	manuelgarcia.info Internet Source	<1%
26	bth.diva-portal.org Internet Source	<1%
27	Submitted to University of Hull Student Paper	<1%
28	hdl.handle.net Internet Source	<1%
29	journals.umt.edu.pk Internet Source	<1%
30	liboasis.buse.ac.zw:8080 Internet Source	<1%
31	www.academic-conferences.org Internet Source	<1%
32	www.frontiersin.org Internet Source	<1%
33	Submitted to University College Falmouth Student Paper	<1%
34	edog.mne.psu.edu Internet Source	<1%
35	ijere.iaescore.com Internet Source	<1%
36	Jose Rafael Espinosa y Victoria. "Multimedia and Virtual Reality Application for Teaching-	<1%

	Learning Human Senses and Therapy of Lateral and Space Location", Electronics Robotics and Automotive Mechanics Conference (CERMA 2007), 09/2007 Publication	
37	Submitted to MS Teams Student Paper	<1 %
38	rauterberg.employee.id.tue.nl Internet Source	<1 %
39	"Data Science and Big Data Analytics", Springer Science and Business Media LLC, 2025 Publication	<1 %
40	Submitted to Multimedia University Student Paper	<1 %
41	ia801207.us.archive.org Internet Source	<1 %
42	oplab.im.ntu.edu.tw Internet Source	<1 %
43	www.e3s-conferences.org Internet Source	<1 %
44	123dok.com Internet Source	<1 %
45	people.ict.usc.edu Internet Source	<1 %
46	uxmag.com Internet Source	<1 %
47	Toko, Guy Roger. "Closing the Digital Gap: Handheld Computing, Adult First-Time Users, and a User Experience Metric Model", University of South Africa (South Africa)	<1 %

	Publication	
48	ltu.diva-portal.org Internet Source	<1%
49	stax.strath.ac.uk Internet Source	<1%
50	www.codeweavers.com Internet Source	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		