School of Electronic Engineering
and Computer Science

Final Report

Programme of study:
BSc Computer Science

Project Title:

Project-History:
An Educational History Game

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Abstract

Students often struggle to take in information taught in lessons, many students find it difficult to learn when classes are not engaging and interactive. Some students find the pacing of lessons too fast. Content heavy subjects such as history rely on memorising dates and events. Not every student can sit in a classroom and memorise all the content taught in this traditional way.

This report describes the current issues with traditional teaching methods and discusses the way a new gamified solution was planned and implemented and whether it was successful in solving the problem.

The objective it to create an educational history game for students to have a more interactive and engaging learning experience. A solution that will aid the long-term retention of content for students whilst keeping them interested and invested in what they are learning.

Whilst educational history games exist, there is a lack of interactivity and curriculum specific content. This project aimed to fill that gap, creating an optimal study and revision tool that not only captivates students' interests but also aligns with academic standards, thereby preparing students for their assessments in an enjoyable and engaging manner.

The game developed fulfils the stated objective by offering an interactive platform that blends curriculum focused content with engaging gameplay mechanics. It stands as a learning aid designed to foster both interest and knowledge retention, addressing the identified gaps in traditional teaching methods and existing educational games. While definitive evidence on long-term retention awaits further testing, the game's design is rooted in educational theories that suggest such outcomes

Contents

Table of Figures

Table of Tables

Chapter 1: **Introduction**

The Introduction section of this report provides an overview of the project's background, outlines the main challenges currently faced in traditional history education, and defines the aims, that guided my development of the Educational History RPG game. This section sets the stage for understanding the need for a new educational approach and the potential impact of my solution.

1.1 Background

Traditional methods of teaching history often struggle to captivate the interest of students, leading to a disengaged learning experience. Memorisation of facts and dates can be tedious, and students may struggle to connect with the relevance of historical events. There is a need for an innovative and effective educational solution that not only aligns with the school curriculum but also engages students in a fun and immersive manner

This project addresses these challenges by developing an educational history RPG game tailored to Key Stages (KS) 1 to 4. The aim is to leverage the immersive nature of gaming to make history engaging and relevant, focusing on specific eras based on educational curriculums.

1.2 Aim

This project aims to address this challenge by developing an educational history game that brings historical eras to life, fostering a dynamic and interactive learning environment for students in KS1 to KS4. By leveraging the immersive and interactive nature of gaming, the project seeks to enhance students' understanding of key historical eras specified in the curriculum. The goal is to make history education more enjoyable, and accessible, whilst still aligned with educational standards, thereby fostering a positive and lasting impact on students' historical knowledge and critical thinking skills.

1.3 Target Audience and Rationale

My game is specifically designed for students ranging from KS1 to KS4 (GCSE). This target group contains children and teenagers approximately aged 5 to 16. The targeted group represents a significant period in academic and cognitive development, where students are more open to try new learning methods.

Compared to older students, the demographic for this project is most likely to embrace game-based learning, which can make a significant impact on their retention of historical facts and their analytical skills. Games are a natural part of children and teenagers lives at these ages, making an educational game an excellent and effective method for delivering substantive educational content.

Furthermore, targeting this age group ensures that the game is an appropriate challenge for students varying levels of maturity and education. The game could be designed to be flexible enough to cater to the wide age range, with scaling difficulty and content depth to suit different educational stages.

This deliberate focus on the demographic ensures my game is not only a tool for education but also a fun and engaging part of the student's daily activities, enhancing both their learning experience and their view of history as an exciting subject.

1.4 Research Questions

How does the use of educational games impact students' long-term retention of knowledge compared to traditional teaching methods?

What is the effect of integrating diverse learning styles into teaching materials?

In what ways can the game cater to different learning styles, and how does it impact students' motivation to engage with historical content across diverse key stages?

What methods of teaching could be used to improve students' memory retention?

1.5 Objectives

The objectives of this project have been split into four key components, each designed to address specific goals and ensure success for this project:

- Research about different Learning Styles
- Develop Educational History Game
- Incorporate Diverse Learning Styles in Game
- Integrate Existing Curriculum

Chapter 2: **Literature Review**

This chapter explores contemporary teaching methods and the advantages of gamification in education. It evaluates the effectiveness of various learning styles and discuses existing gamified educational approaches, ending with the introduction of my proposed solution.

2.1 Approaches to Improve Educational Outcomes in History Learning.

2.1.1 Traditional Teaching Methods

Traditional approaches in history education involve classroom presentations and reliance on textbooks. This method has been the staple for teaching history worldwide. Whilst it correlates directly with the curriculum and occasionally there are some engaging activities to go with the presentations, the effectiveness of this traditional method can be quite limited due to its lack of engagement interactivity. That combined with the heavy content volume can cause students to struggle with information overload which may affect retention of information.

Due to the lack of engagement of traditional presentation-based learning, teachers have been incorporating multimedia tools such as videos into history lessons. This includes documentaries, movies, real historical footage and educational videos specifically targeted at students. Whilst these can significantly improve the visual learning aspect, the challenges arise when dealing with the different and diverse learning styles of students as well as students dealing with a lot of content in the little time it takes for the video to finish.

2.1.2 Gamification in Education

Gamification is an approach that integrates game-like features and elements into non-game contexts, like learning history for example. It puts elements such as interactive challenges and rewards to make learning more fun and engaging as it also aligns with the common interest of many young students which is games. This approach instils a competitive mind into students as they want to do better to have more points/ get better rewards and therefore will put in the effort to learn and gain more knowledge, fostering a more learner-centric environment.

Gamification is used throughout various schools and subjects. Many schools use a point system based on students' behaviour who are then rewarded if they reach a certain threshold. Many online platforms such as BBC Bitesize provide small web games to aid learning, making it more dynamic and appealing to the digital generation.

Researchers from Hong Kong Baptist University (Department of Sport, Physical Education and Health) experimented to show the "*Application of the Educational Game to Enhance Student Learning* (Cheung & Ng, 2021)*".* In this experiment, 56 University students doing a degree in physical education and recreation management were asked to play the educational game "PaGamO" to help them learn and study a motor learning and development module.

A 100-question multiple choice quiz (MCQ) was created by the lecturer of the motor learning and development course and was incorporated into "PaGamO". This was used to test how much of the content the students were learning and remembering after playing the game. 20 multiple choice Questions from this game would be included in the final exam thereby combining the gamified learning approach with formal assessments.

A pivotal aspect of the study was the motivational strategy embedded in the game. Students were told that their performance and scores on "PaGamO" would contribute to 5% of their final grade, making students more eager to participate. Effectively this created an environment where learning became a lot more engaging and competitive.

The results of the study showed a significant correlation between the scores obtained in the "PaGamO" game and the multiple-choice section of the final exam. The researchers observed a medium positive correlation suggesting that students who performed well in the educational game also scored high in the formal assessment.

This study also uncovered valuable insights into student learning strategies with students "Adopting the trial and error strategy to strengthen their memory on the subject (Cheung & Ng, 2021)". The students expressed that the game opportunity for self-testing and repetition allowed for long-term retention of knowledge and stated that the game made learning the content both enjoyable and memorable

In conclusion, this experiment shows that innovative teaching approaches enhance student learning. The successful integration of gamification, as shown by "PaGamO" not only stimulated students to show more interest it also demonstrated its capabilities to improve knowledge retention of content. Although there was a minority who did not seem to be more interested in a gamification learning approach, most students stated that it made their learning experiences more fun, engaging and competitive. As the exploration of gamification extends to different levels of education, this study offers a concrete understanding of its effectiveness and can serve as proof for teachers looking for more innovative ways to teach.

2.2 Researching Different Learning Styles.

2.2.1 Introduction to VARK

The VARK Model, introduced by Neil Fleming, categorises learning styles into 4 categories: Visual(V), Auditory(A), Reading/Writing (R) and Kinesthetic (K)

(Fleming & Baume, 2006). Each category represents a different way learners prefer to interact with and absorb information. Visual learners prefer to learn from pictures and videos, Auditory learners take in their information by listening, Reading/Writing learners benefit from textual materials and Kinesthetic learners thrive through hands-on experiences.

By knowing these different styles, educators can adapt and alter their learning methods to create a more effective and diverse learning environment that can cater to the diverse preferences of students.

2.2.2 Application of the VARK Model in Education

A research study conducted by Sara Wright and Anthony Stokes at the Australian Catholic University (ACU) examined the effectiveness of the VARK model in enhancing student engagement within university level economics courses. This investigation was prompted by a noticeable decline in enrolments in economics-based degrees, caused by the student dissatisfaction with conventional teaching methods. Wright and Stokes created a survey to find out the preferred learning styles among economics students, revealing a closely distributed preference (scores are out of 10) for Visual (V) with a score of 7.7, Aural (A) at 6.8, Read/Write (R) at 7.5, and Kinesthetic (K) at 7.3.

Subsequently, two introductory economics modules at ACU were altered to incorporate VARK methodologies. A follow up survey assessed the impact of these changes on teaching quality and student interest. The results indicated a significant increase in student enthusiasm and interest in the subject matter. Furthermore, students reported an improvement in the quality of teaching, attributing this enhancement to the curriculum's adaptation to diverse learning styles.

2.2.3Conclusion of Study

In conclusion, the positive outcomes highlighted by the student surveys shows that altering educational strategies to accommodate diverse learning preferences significantly enhances both the quality of education and the level of student engagement. As evidenced by the findings of the study, "Students learn more effectively if they are interested in the subject matter that they are studying." (Wright & Stokes, 2015) This reinforces the concept that cultivating a genuine interest in students not only maximises their academic potential but also improves their overall educational experience.

2.2.4 Relevance to my Project

One of my objectives for this project is to integrate diverse learning styles into a gaming environment. This approach is intended to ensure a more inclusive and effective learning environment. By planning to engage these diverse learning preferences, the project aspires to enhance educational outcomes specifically within the history subject, making the learning process engaging and adaptable to different student needs. This incorporation of VARK methodologies in my game, is anticipated to significantly improve the educational experience, leaving students satisfied by catering to various learning styles.

2.3 Similar Existing Games/Websites

Mission US: This is a series of interactive adventure games designed for teaching American history. Pros include engaging storytelling. A con might be the focus on American history, which may not be suitable for all audiences.

BBC Bitesize Games: BBC Bitesize offers a range of educational games covering various periods. Pros include a clear educational focus and alignment with curriculum standards. However, the games may be limited in terms of depth and engagement and may not be enjoyable.

Classcraft: While not strictly a history game, Classcraft is an educational platform that teachers can use to gamify their classrooms. This can be customised to include history-related content and lessons. Pros include flexibility with different subjects, but a potential con could be the learning curve for teachers

PaGamO: PaGamO is an online multiplayer strategy game that combines learning with gaming. Players can create and explore virtual worlds whilst completing educational tasks. Pros include the adaptability for different subjects and the ability to collaborate with classmates, however, the cons are it is also a learning curve for teachers to figure out how to use and for students it is only accessible via an invite from teachers.

2.4 Proposed Solution

My project aims to develop a gamified approach to learning, in the form of an RPG-style game specific to history. Building upon existing similar games, this game will cater to multiple learning styles that students use and will be easy to use/understand meaning teachers won't have to be trained on how to use it. In addition to this, it will feature immersive storytelling to keep students engaged. It will feature a points and rewards system to make sure students are being recognised for their effort and achievement. Significant features of this solution are that it will allow the user to learn and test themselves at their own pace, ensuring they understand the content they are learning. The aim is to create an engaging learning environment that caters to diverse learning styles. The game will allow users to essentially live throughout the historical periods they are learning about potentially using the relatability of the game to aid them in their learning and boost interest. This solution not only attempts to make history education seem a lot more enjoyable but also enhances the long-term retention of historical content and knowledge.

2.5 Comparison to existing educational games

Table 1: Comparison to Existing Educational Gaming Platforms

Feature/Aspect	ProjectHistory (My Game)	Mission US	BBC Bitesize Games	Classcraft	PaGamO
Focus	RPG-style game specific to history curriculum	Interactive adventure games for American history	Short Educational games for various periods	Gamified educational platform	Multiplayer strategy game
Curriculum Alignment	Custom-tailored to history curriculum	Aligned with Only American history	Aligned with various curriculum standards	Can be customised for different subjects	Adaptable for different subjects
Engagement	Immersive storytelling and interactive learning	Engaging storytelling focused on American history	Educational focus but limited depth	Customisable gamification of classroom content	Learning through game-based tasks and collaboratio n
Accessibility	Easy to use with no training required for teachers	Suitable mainly for audiences interested in American history	Broad accessibility but may lack depth	Requires teachers to learn the platform	Requires teacher invitation for student access
Learning Pace	Self-paced learning and testing	Structured interactive progression	Predetermined learning paths	Teacher-controlled gamification	Teacher-defined educational tasks
Recognition of Achievement	In game cosmetic rewards for completing certain quests.	Not specified	Not specified	Points and badges within the gamified classroom	Points and rewards within the game world
Student Autonomy	Enables living through historical periods at one's own pace	Limited by game narrative	Structured games with limited choices	Depends on classroom implementation	Limited by teacher's setup and game structure
Suitability for Diverse Learning Styles	Caters to multiple learning styles	Limited adaptability	General suitability but limited engagement	Highly flexible for different learning styles	General adaptability for different learning styles
Implementation Learning Curve	Minimal for both students and teachers	Minimal for students; varies for teachers based on curriculum	Minimal for students and teachers	Moderate for teachers	Moderate for teachers and dependent on teacher facilitation

Potential for Long-Term Retention	High due to immersive and relatable content	Moderate, dependent on student's interest in American history	Moderate, dependent on depth of games	Can be high if well integrated into classroom activities	Varies depending on engagement and collaboration levels

Chapter 3: **Analysis & Design**

This section outlines the development and educational framework of my project. It covers the game's design, objectives, and the technical and educational requirements for creating an engaging learning environment.

3.1 Analysis

3.1.1 Game Description

In this RPG-style game, you are a time traveller, travelling to different periods to solve the world's mysteries. This game will feature combat like the style of Pokémon, wherein in each battle the player progresses by completing quizzes based on different historical eras taken from the educational curriculum

3.1.2 Project Objectives

Engaging Learning: Create a game that makes learning history fun and engaging for students, encouraging them to learn.

Gamification: create a system that rewards students for their hard work and progress in learning the curriculum

Educational Content: Develop historical content that aligns with the curriculum based on their level of study, covering key topics.

Customisation: Allow students to personalise their in-game characters based on the rewards they obtain from completing quizzes/quests

Diverse Learning: Integrate different ways to learn into the game so that I can be inclusive of students varied preferences.

Accessibility: Ensure that the game is easily understandable and accessible via WebGL so that it can be accessed anywhere and, in any classroom, and that no specific software is required to run the game

3.1.3 Requirements

Technical Requirements

Platform: Develop in Unity for web (via WebGL), Windows, macOS, and desktop-based platforms.

Game Engine: Choose a suitable game engine for development (Unity).

Art and Design: Create visually appealing assets and animations.

Database and Analytics: Implement a database table for holding quiz questions.

Educational Content Requirements
History Syllabus: Research and incorporate content from KS1 up to the GCSE history curriculum.

Educational Resources: Include historical documents, facts, and references within the game.

Assessment: Develop quizzes, assessments, or challenges to evaluate students' knowledge.

User Experience Requirements
Engagement: Create a captivating and immersive gaming experience with engaging narratives and quests.

Tutorials and Help: Provide in-game tutorials and help features for students who need guidance.

Accessibility: Ensure the game is accessible to all students, including those with disabilities.

3.1.4 Project Platform

I have decided to create my game on the game development platform Unity. My game will be developed for use on any browser via WebGL as well as a version available for MacOS and Windows.

Unity is a versatile game development engine. It enables developers to create 2D, 3D and virtual reality (VR) games. Unity provides a comprehensive set of tools and a user-friendly interface, making it accessible for both beginners and experienced developers. It allows you to code games in either C# or using its visual scripting system.

I chose Unity because I have previously used it for other modules in my course as well as for personal projects, I therefore feel a lot more comfortable with Unity compared to other game engines. Unity makes everything clear and makes it very easy to understand how to use it, hence I have chosen to make my project in Unity.

WebGL (Web Graphics Library), is an API that enables you to render 2D and 3D graphics within a web browser without the need for additional plugins.

I have chosen WebGL for its accessibility. Being browser-based, it eliminates the need for users to install specific software, making the content easily shareable and accessible across various platforms.

3.1.5 Educational Content

The AQA curriculum was selected for the game due to its comprehensive coverage and structured approach to education, making it one of the most widely recognised exam boards used by schools across the UK. Using AQA's structured syllabus ensures that the game's content is not only just educational but also directly relevant to students' academic assessments. This enhances the game's utility as it will be able to offer students aid, helping them prepare for their exams through interactive and engaging gameplay.
The current AQA curriculum includes:

KS1: Gunpowder plot, Florence Nightingale, Christopher Columbus, Great Fire of London

KS2: First Railways in Britain, Resistance against Roman Empire (Boudica), Changes from Stone Age to Iron Age (Stonehenge), Anglo-Saxon invasion

KS3: Battle of Hastings and Norman conquest (William Duke of Normandy), Black Death and its effect on society, French Revolution Wars, WW2

KS4: America- Opportunity and equality (1920-1973), WW1- Conflict and Tension (1894-1918), Power & the people (1170- present) (e.g., King Henry VIII), Norman England (1066-1100)

3.2 Design

3.2.1 UML Class Diagram

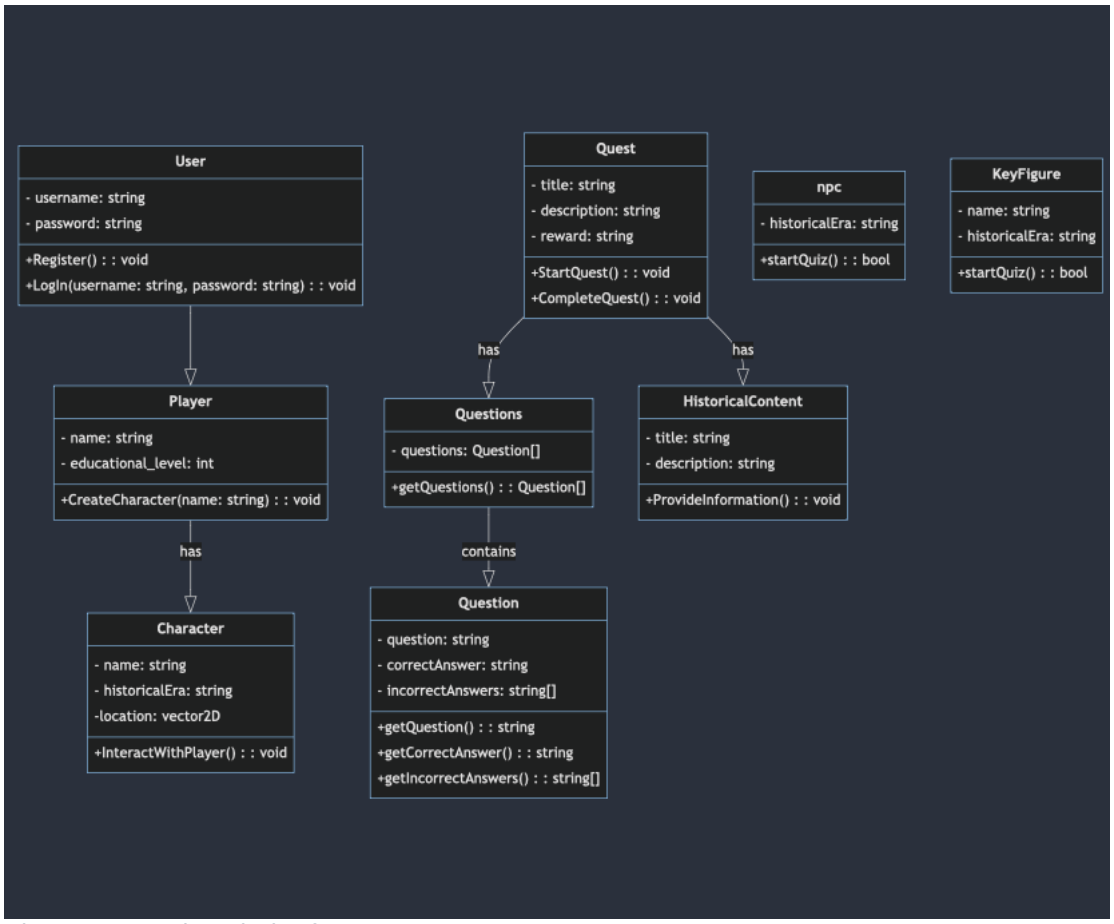


Figure 1: UML Class design for my game

```
class User {
   - username: string
   - password: string

   + Register(): void
   + LogIn(username: string, password: string): void


 }
 class Player {
   - name: string
   - educational_level: int

   + CreateCharacter(name: string): void


 }

 class Quest {
   - title: string
```

```
  - description: string
  - reward: string
  + StartQuest(): void
  + CompleteQuest(): void
}

class Question {
  - question: string
  - correctAnswer: string
  - incorrectAnswers: string[]

  + getQuestion(): string
  + getCorrectAnswer(): string
  + getIncorrectAnswers(): string[]
}

class Questions {
  - questions: Question[]
  + getQuestions(): Question[]
}

class Character {
  - name: string
  - historicalEra: string
  -location: vector2D
  + InteractWithPlayer(): void
}
class npc {
  - historicalEra: string
  + startQuiz(): bool
}
class KeyFigure {
  - name: string
  - historicalEra: string
 + startQuiz(): bool
}

class HistoricalContent {
  - title: string
  - description: string
  + ProvideInformation(): void
}
```

3.2.2 State Transition Diagram

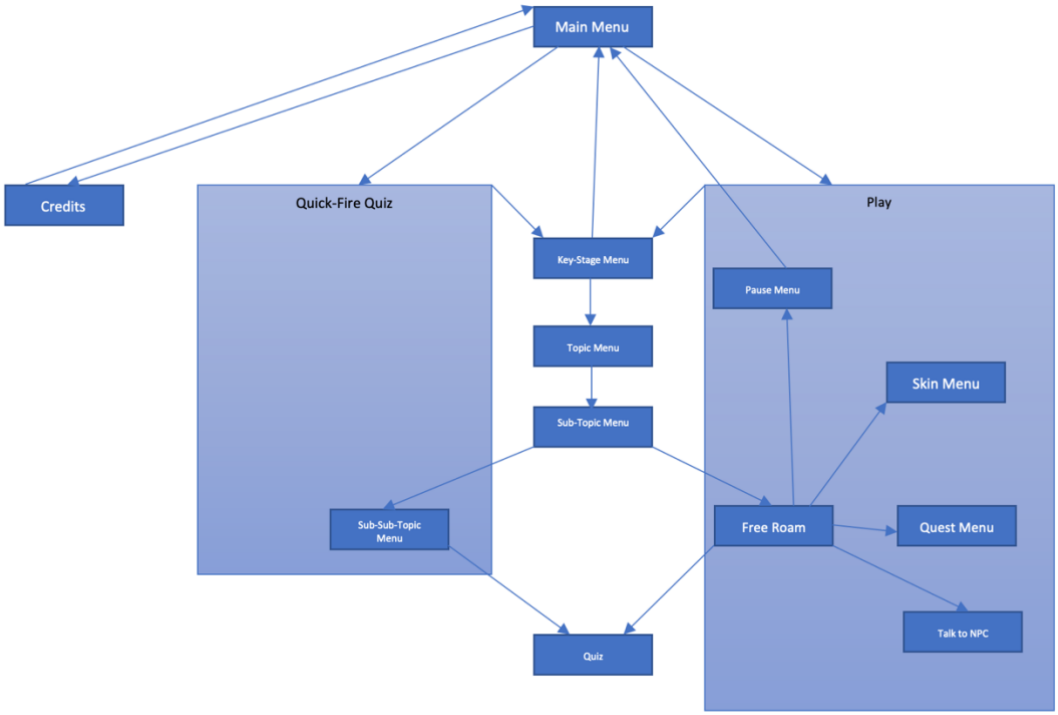


Figure 2: State Transition Diagram for the game

The State Transition Diagram presented in Figure 2 shows the flow and structure of navigation within the game. It serves as a blueprint of the user's journey, starting from the Main Menu, which acts as the central hub. From here, users can choose to dive into a 'Quick-Fire Quiz' for a quick test of their knowledge or explore the 'Play' section, in which they'll be able to free roam the historical time periods and learn at their own pace. The ability to filter from key-stages to topics to sub-topics, showcases the game's flexibility and the depth of interactivity it can offer, with multiple pathways adapting to the user's preferences for a personalised learning experience.

3.2.3 User Interface Design

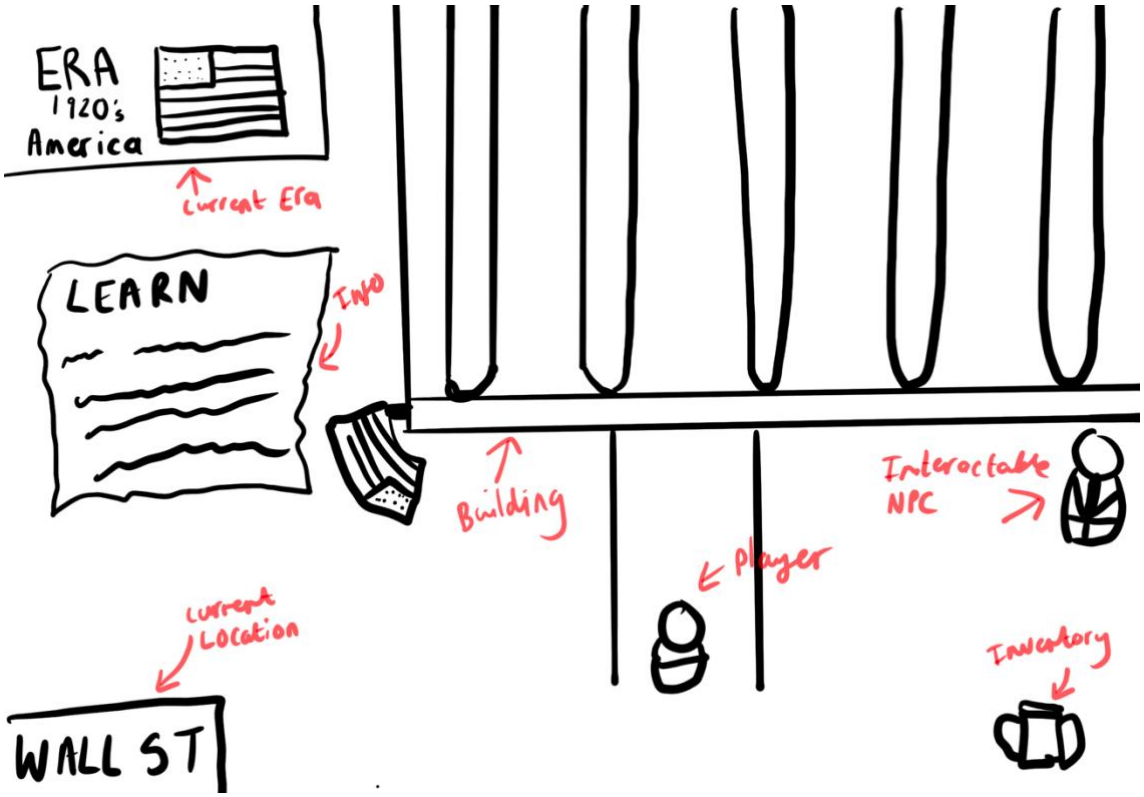


Figure 3: Drawing of how I intend the free roam aspect of the game to look

Figure 3 resembles how I intend the "Gameplay" state from the state transition diagram to look. The user is free to walk the map visiting key historical places regarding that specific topic (in this case Wall St) and will be encountering key figures whom they can start a quiz with and gain rewards for completion. This State will allow users to learn by displaying content information in various ways, whether it be text, images, or audio. This will allow Players to relate more with the content they are learning in the game and the classroom as they will have essentially lived through it via the game.

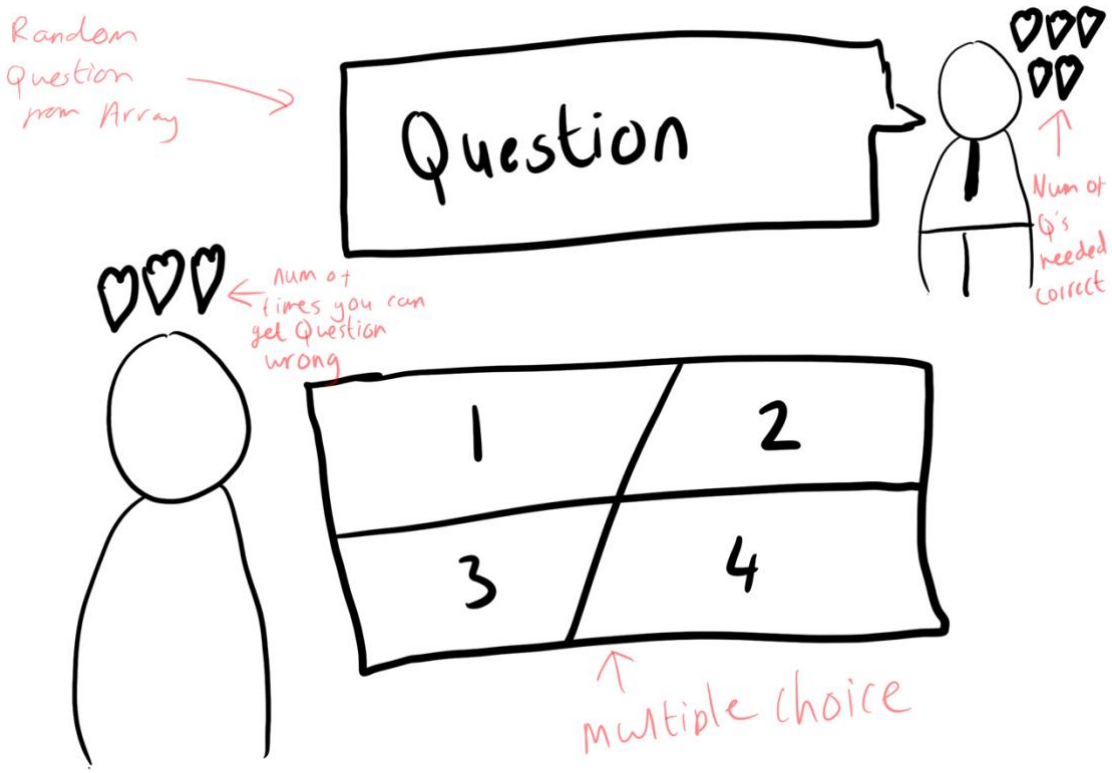


Figure 4: Drawing of how I intend the quiz aspect of my game to look

Figure 4 resembles how I intend the "Quiz" state from the state transition diagram to look like. In this state, there will be a multiple-choice quiz. Questions are stored in a database table along with the multiple-choice answers and the correct answer. You as the player will have a certain number of lives which resembles the number of questions you can get wrong before you fail the quiz. In contrast to this, the figure asking the question will have a certain number of lives resembling how many questions you need to answer correctly to complete the quiz. Random characters will have fewer questions needed to complete the quiz, whereas key figures in history will require more.

3.3 Game Modes

3.3.1 Free-Roam

The Free-Roam mode would serve as the default game mode in which players can explore a historically accurate map filtered by distinct time periods. This immersive environment would allow users to engage in quests that are made into real historical contexts, such as conversing with flappers from the roaring 1920s. Through these interactions, players would gain insights into the lives and experiences of historical figures and events. Additionally, the mode would incorporate quizzes that test the player's newly acquired knowledge, rewarding successful completions with cosmetic rewards for their character, further enriching their gamified learning experience.

3.3.2 Quick- Fire Quiz

The Quick-Fire Quiz mode would offer a fast, dynamic challenge for players to test their historical knowledge. In this mode, players would be able to select quizzes based on specific historical topics, providing a direct and efficient method to assess their understanding of a particular topic. Unlike the Free-Roam mode, Quick-Fire will not include conversional learning content but focuses solely on evaluating knowledge through rapid, targeted quizzes. This mode is particularly useful for reinforcing learning and tracking progress, allowing players to quickly identify areas where further review may be needed.

3.4 Methodology

3.4.1 Educational Theories used in Game Design

The quiz design in the game includes progression through different levels but it is possible that questions from previous levels can still appear at the higher levels. Previous studies in the literature show that repetition can help aid in memory retention.

Chen and Yang, who conducted a study examining the impact of multiple exposures on memory performance, revealed that repetition learning is a highly effective method to enhance memory performance, both in daily life and educational practice (Chen & Yang, 2020). A notable outcome of this study was that it found that the benefits of repetition were not merely a result of increased familiarity with the material but were attributed to the process of recollection. This distinction is crucial because it implies that repetition aids in the deeper processing of information, making the memories more robust and less likely to fade over time.

Further evidence supporting the effectiveness of repetition in enhancing memory comes from a variety of standard recall and recognition experiments. Repetition has been consistently found to improve performance across a range of memory tasks (Hintzman, 2010). This study underscores the fundamental role of repetition in strengthening memory, highlighting its utility in educational practices, including the design of my game's quizzes

Previous research on education, studies different ways which can help users learn and absorb information, including visual representation. This led to my decision of using AI-generated visuals that accurately reflect historical eras, figures, and the people of their respective time periods.

Incorporating visual representations in my game aligns with the principles outlined in the Cognitive Theory of Multimedia Learning, by Richard E. Mayer. According to Mayer, individuals learn more effectively when presented with both verbal and visual materials, a principle known as the multimedia principle (Mayer, 2005). This theory is grounded in the idea that the human cognitive system has separate channels for processing visual and auditory information (Mayer, 2005)

By presenting characters that are historically accurate, not only does it enhance the immersive experience of the game, but also provides a unique educational value. Visual learners stand to benefit significantly from this approach. They can better understand and remember historical contexts and events when they see authentic representations. This commitment to historical accuracy in the visuals goes beyond entertainment, it's about creating a rich, engaging platform where learning is seamlessly integrated into the gaming experience. I believe that this method will not only enrich the users' understanding of history but also foster a deeper appreciation for the intricacies and realities of past eras.

3.4.2 Researching for my Quiz and Dialogue Content

To gather content for my quiz questions and NPC dialogues, I relied on three key resources that ensured both the historical accuracy and alignment with the AQA GCSE curriculum. The primary source was the “AQA GCSE History Specification” (AQA, 2019), which provided a base structure of which specific topics (such as: Roaring twenties, Great Depression, Boom, etc) I would need to include to stick as close to the curriculum.

Additionally, the “Pearson Revise AQA GCSE History America, 1920-1973: Opportunity and Inequality Revision Guide” (Clifford, 2018) as well as the “Oxford AQA GCSE History (9-1): America 1920-1973: Opportunity and Inequality Revision Guide” (Wilkes, 2018) served as my main source of information in order to build up on the foundation set by the specification. The reason I chose these 2 revision guides is because both Pearson and Oxford are trusted publishers in the educational field with a variety of their guides across different subjects being used in schools to help students revise and learn. Both guides provided me with a lot of information that I used to help make my questions and make my characters and key figures come alive in my game.

3.4.3 Database managing and hosting software

For the development of the interactive quizzes in the game, I utilised the XAMPP platform which includes Apache Web servers along with phpMyAdmin. I used these to create, manage, and host my database. These tools were crucial in establishing the database tables that house the quiz questions and multiple-choice options, which are key to the game's interactive learning modules

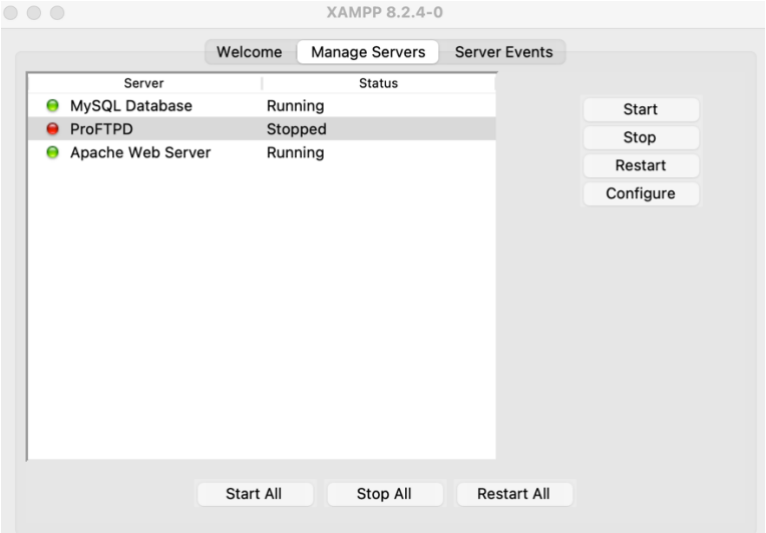


Figure 5: XAMPP running my web server

Apache HTTP Server is an open-source web server software. (Apache Software Foundation, 2024) It is an essential tool for web hosting as it processes requests from clients, delivering web pages and other content over the internet or local networks. For me, it helped me host my database containing my quiz details over a web server

phpMyAdmin is also an open-source tool for MySQL databases, (phpMyAdmin contributors,, 2024) accessible via a web browser. It provides a graphical user interface to simplify the management of database activities, including the creation, modification, and deletion of databases and tables. This enabled me to efferently make my database tables with ease.

I chose to use Apache and phpMyAdmin for this project primarily due to my familiarity with both tools from previous modules. This prior experience allowed me to feel comfortable and confident in their ability to effectively host and manage the databases required for the game. Using these tools enabled me to host my database with ease and a have a seamless setup for the tables, which stored all the critical data for the game's interactive quizzes, including questions and multiple-choice options. My comfort level with Apache and phpMyAdmin significantly streamlined the development process.

Chapter 4: **Implementation**

This section details the practical steps taken to build and integrate the game's backend and frontend components. It covers the setup and management of databases, the process of integrating SQL within the Unity engine, and provides documentation through the process of implementing this game

4.1 Database Setup and Management

4.1.1 Creating Tables.

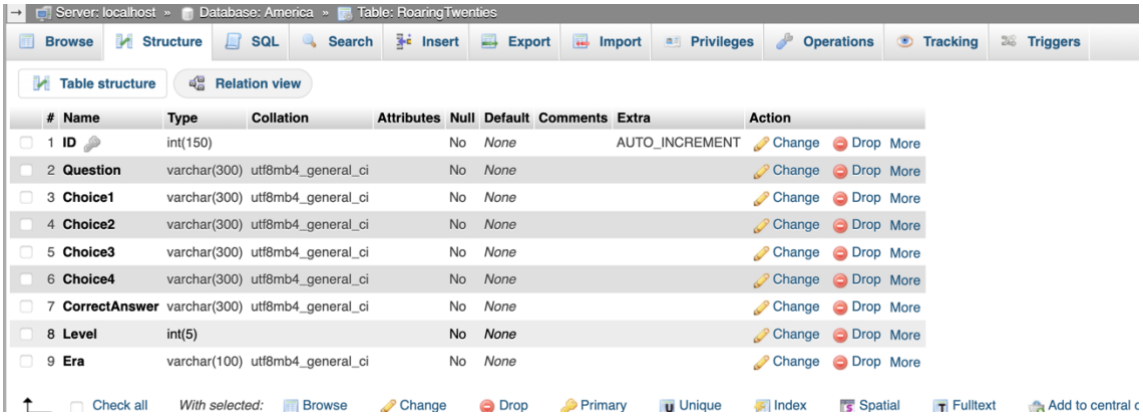
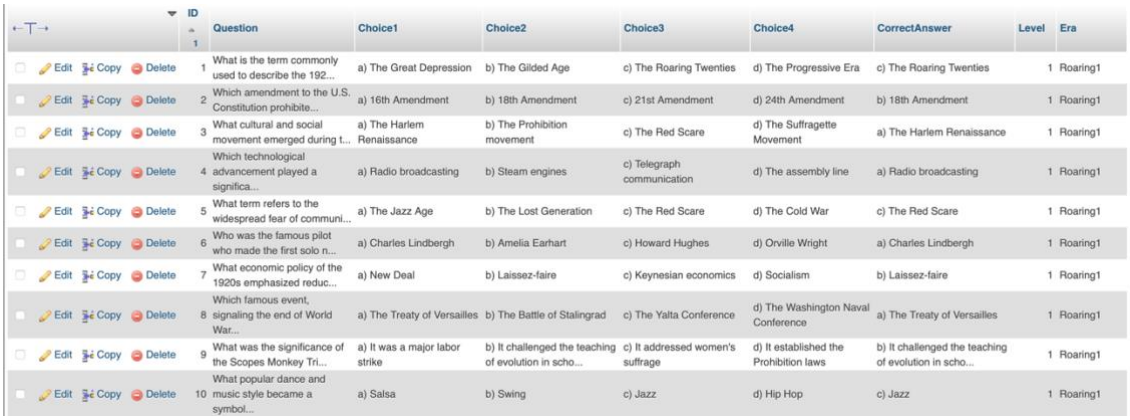


Figure 6: Structure for SQL tables that hold quiz questions

Figure 6 shows a database table titled 'RoaringTwenties' within the phpMyAdmin management interface. The table has nine columns: ID, Question, Choice1, Choice2, Choice3, Choice4, CorrectAnswer, Level, and Era. The ID column is set to auto-increment, ensuring that each entry has a unique identifier (primary key). The 'Question' column stores the text of the questions for the quiz, while 'Choice1' through 'Choice4' hold the possible answers. 'CorrectAnswer' contains the right choice among the four provided. Level is the difficulty of the question being either 1,2 or 3 and the Era being the genre of the question (for example, crime, culture, economics etc). This structure is fundamental for organising and retrieving data for the quiz portion of the history game, allowing for dynamic question generation

4.1.2 Adding Questions to tables



	ID	Question	Choice1	Choice2	Choice3	Choice4	CorrectAnswer	Level	Era
Edit Copy Delete	1	What is the term commonly used to describe the 192...	a) The Great Depression	b) The Gilded Age	c) The Roaring Twenties	d) The Progressive Era	c) The Roaring Twenties	1	Roaring1
Edit Copy Delete	2	Which amendment to the U.S. Constitution prohibite...	a) 16th Amendment	b) 18th Amendment	c) 21st Amendment	d) 24th Amendment	b) 18th Amendment	1	Roaring1
Edit Copy Delete	3	What cultural and social movement emerged during t...	a) The Harlem Renaissance	b) The Prohibition movement	c) The Red Scare	d) The Suffragette Movement	a) The Harlem Renaissance	1	Roaring1
Edit Copy Delete	4	Which technological advancement played a significa...	a) Radio broadcasting	b) Steam engines	c) Telegraph communication	d) The assembly line	a) Radio broadcasting	1	Roaring1
Edit Copy Delete	5	What term refers to the widespread fear of communi...	a) The Jazz Age	b) The Lost Generation	c) The Red Scare	d) The Cold War	c) The Red Scare	1	Roaring1
Edit Copy Delete	6	Who was the famous pilot who made the first solo n...	a) Charles Lindbergh	b) Amelia Earhart	c) Howard Hughes	d) Orville Wright	a) Charles Lindbergh	1	Roaring1
Edit Copy Delete	7	What economic policy of the 1920s emphasized reduc...	a) New Deal	b) Laissez-faire	c) Keynesian economics	d) Socialism	b) Laissez-faire	1	Roaring1
Edit Copy Delete	8	Which famous event, signaling the end of World War...	a) The Treaty of Versailles	b) The Battle of Stalingrad	c) The Yalta Conference	d) The Washington Naval Conference	a) The Treaty of Versailles	1	Roaring1
Edit Copy Delete	9	What was the significance of the Scopes Monkey Tri...	a) It was a major labor strike	b) It challenged the teaching of evolution in scho...	c) It addressed women's suffrage	d) It established the Prohibition laws	b) It challenged the teaching of evolution in scho...	1	Roaring1
Edit Copy Delete	10	What popular dance and music style became a symbol...	a) Salsa	b) Swing	c) Jazz	d) Hip Hop	c) Jazz	1	Roaring1

Figure 7: SQL table populated with questions

After setting up the structure of the database tables, I used the AQA GCSE History curriculum as a guide to populate the table with relevant questions. This ensured that the content of the game's quizzes is closely aligned with the educational standards and learning objectives set out by the curriculum, providing an accurate and valuable learning tool for students studying or revising.

4.2 Integrating SQL into Unity

4.2.1 Creating Php link for tables

```
<?php
   $servername = "localhost";
   $username = 'root';
   $passwword = '';
   $dbName = "America";
   //make connection


   $conn = new mysqli ($servername,$username,$passwword,$dbName);
   //check connection
   if(!$conn){
      die("connection failed".mysqli_connect_error());
   }
   $sql = "SELECT ID,Question,Choice1,Choice2,Choice3,Choice4,CorrectAnswer,Level,Era FROM
RoaringTwenties";
   $result = mysqli_query($conn,$sql);
```

```
    if(mysqli_num_rows($result) > 0){
        while($row =mysqli_fetch_assoc($result)){
            echo "ID: ".$row['ID']."|Question: ".$row['Question'] ."|Choice1: ".$row['Choice1'] ."|Choice2:
".$row['Choice2'] ."|Choice3: ".$row['Choice3'] ."|Choice4: ".$row['Choice4'] ."|CorrectAnswer:
".$row['CorrectAnswer'] ."|Level: ".$row['Level'] ."|Era: ".$row['Era'] . ";";
        }
    }
?>
```

Figure 8: PHP script showing how i got data from my database

Figure 8 shows a php script that takes the database table and creates a URL that outputs rows of data from the database table, ending each row with a semi colon so it is easily distinguishable when it ends and starts.

4.2.2Php link

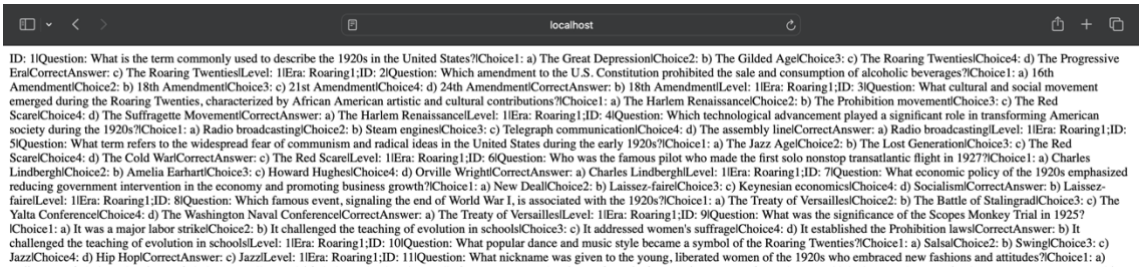


Figure 9: Php URL of table data

Figure 9 is an example of the created URL from the php file. It also shows the outputted data from the database table.

4.2.3Loading Php link into Unity

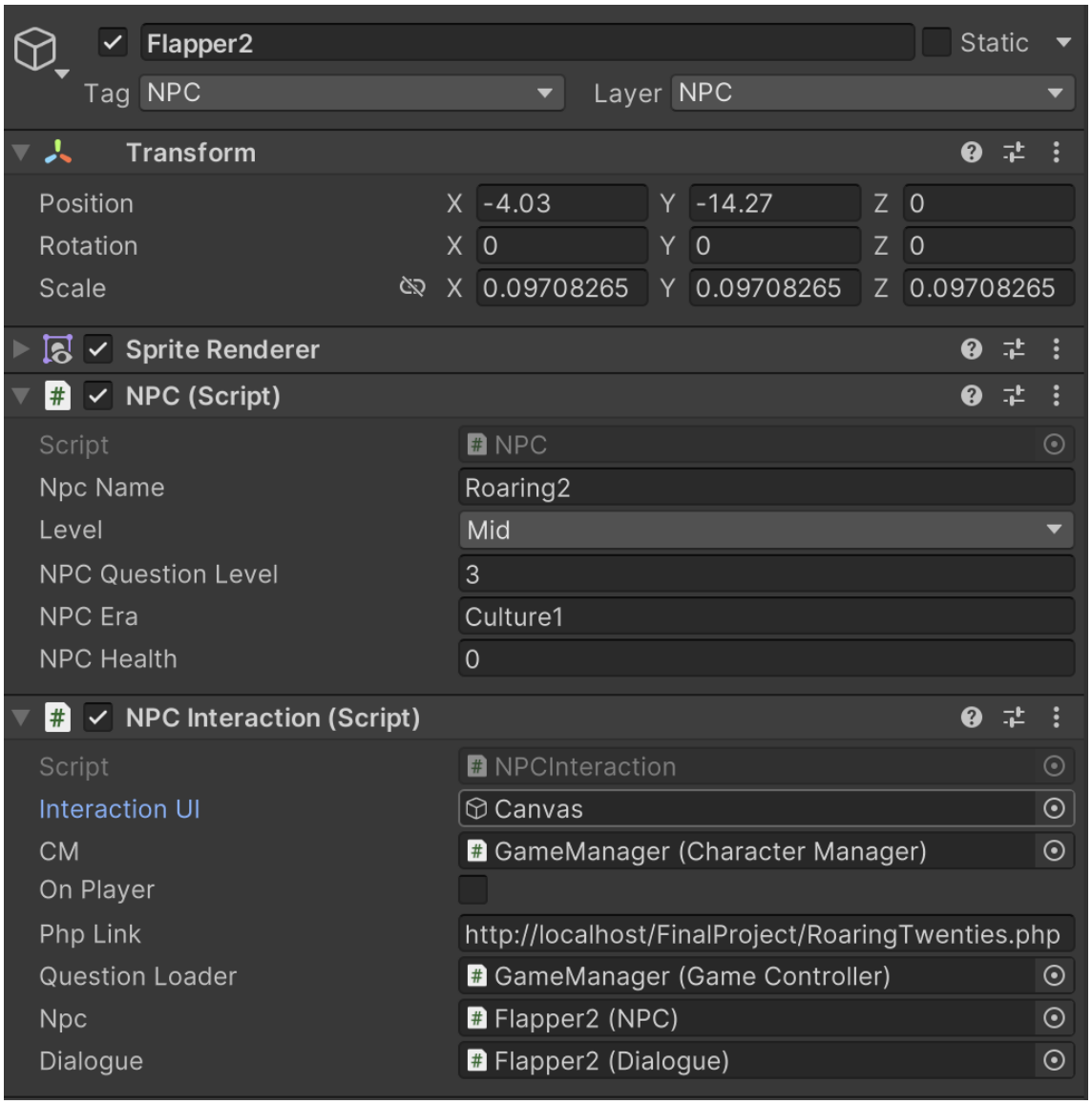


Figure 10: Variables attached to each NPC

Each NPC within the game is assigned a public string variable named 'Php Link'. This variable specifies the unique database table that corresponds to the particular NPC, ensuring that the character pulls the correct set of questions from the database. Additionally, these NPCs have another variable named 'NPC Era'. This variable is used to filter the questions drawn from their assigned table to those that match the NPC's specific topic. Together, these variables facilitate a structured and relevant quiz experience that is tailored to each NPC's narrative role within the game.

```
public void SetQuestionsURL(string url)
{
    questionsURL = url;
    //StartCoroutine(LoadQuestions());
}

// The coroutine that loads questions from the set URL
IEnumerator LoadQuestions()
{
    questionData = new WWW(questionsURL);
    yield return questionData;
    string questionDataString = questionData.text;
    print(questionDataString);
    string[] allQuestions = questionDataString.Split(';');
    List<string> filteredQuestions = new List<string>();
```

Figure 11:C# script, showing how I integrated php data in my game

The code in Figure 11 is from a Unity C# script and outlines the mechanism for triggering in-game quizzes. Upon the player's interaction with an NPC, characterised by the collision with the NPC's box collider, the SetQuestionsURL method is invoked. This method assigns the NPC's PHP link to the global questionsURL variable, establishing the source for the quiz questions.

When the player opts to start a quiz, the LoadQuestions coroutine is activated by the player clicking on the 'quiz' button. This routine determines the specific set of questions to present in the quiz. The selection process of these questions is randomised, yet the pool from which they are chosen is defined by the NPC's PHP link and a variable named 'Npc Era'.

The 'Npc Era' variable operates as a filter based on the following criteria:

Exact Era Match: If 'Npc Era' matches an era's name exactly as listed in the database table, the quiz will only feature questions from that specific era. For instance, if 'Npc Era' is "Culture2," only questions tagged as "Culture2" in the table will be displayed.

Asterisk Usage ("*"): An asterisk in the 'Npc Era' signifies a wildcard selection, prompting the game to include questions from all eras within the specified NPC's database table.

Hyphen Utilization ("-"): A hyphen enables an NPC to cover multiple related eras. For example, if 'Npc Era' is set to "-Culture," it will show questions from any era that includes the term "Culture" within its name, such as "Culture1," "Culture2," "Culture3," and so on.

And Symbol ("&"): The “And” symbol enables an NPC to cover multiple eras from the same database table. For example, if 'Npc Era' is set to "Crime&Culture”, it will show questions where era is "Crime" as well as the questions where era is “Culture”.

4.3 Screenshots of Implementation

Most artwork displayed within the game, including the Menus, historical locations and character designs, have been generated using advanced AI technology. This strategic decision was primarily driven by the need to optimise the development timeline. Utilising AI for graphic creation not only streamlined the artistic process ,giving a more realistic outcome but also allowed me to devote more time to other aspects such as game mechanics, narrative development, and educational content alignment. The AI's ability to rapidly produce historically accurate visuals has been significant in achieving an engaging user interface, while accelerating the game's journey from a concept to a classroom ready product.

For the initial stage of my project, I have selected the "America: Opportunity and Inequality" module from the AQA GCSE History curriculum. This choice aims to illustrate the educational utility and efficancy of my history RPG game in a clear and meaningful way. It's essential to understand that this topic represents only the potential and does not reflect the full extent of my project (incorporating all topics from all key-stages). Upon the successful execution and assessment of this module, my future intention is to broaden the scope of the project to include additional key stages (1-3) and the complete AQA GCSE History syllabus. The focus on American history at this point is intended as an initial demonstration, designed to highlight the game's mechanics and its capacity to engage students.

Figure 12: Title Screen for the Game

Shown in Figure 12 is the title screen for the game. This will be the central hub where users can decide which game mode they want to play, whether they want to explore the map and engage with historical figures, or just test their knowledge with some quick fire questions .Users will also have the options to view the game credits.

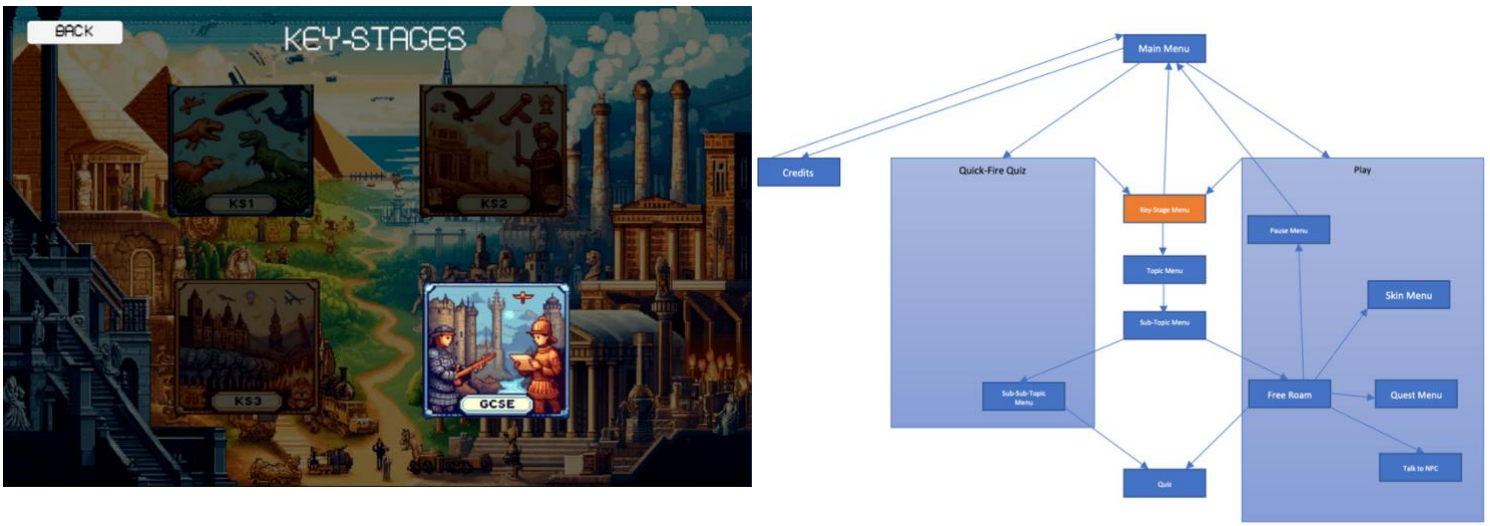
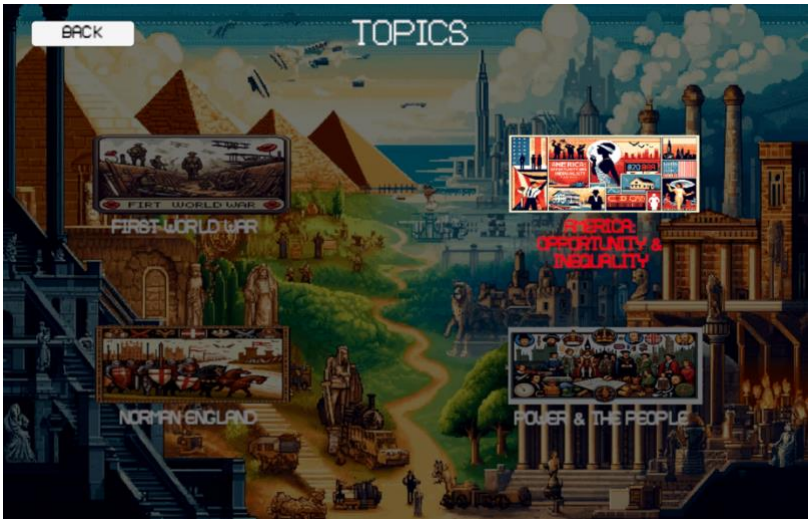


Figure 13: Key Stage selection menu

Displayed in Figure 13 is the Key Stage selection menu of the game, which serves as a navigational hub for learners to select their desired educational level. This menu is systematically divided into different segments, each corresponding to a specific Key Stage educational level: KS1, KS2, KS3, and GCSE. This interface was carefully crafted to ensure ease of use and to reinforce the historical themes through immersive graphics. For the sake of the project, I have decided to do GCSE only and have greyed out other key stages to show that they are currently unavailable



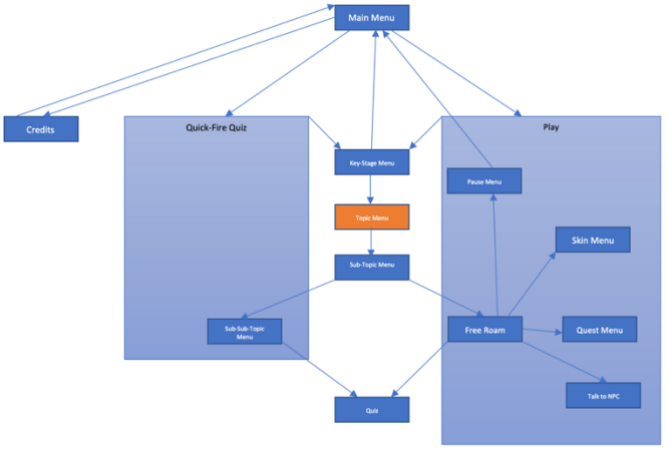
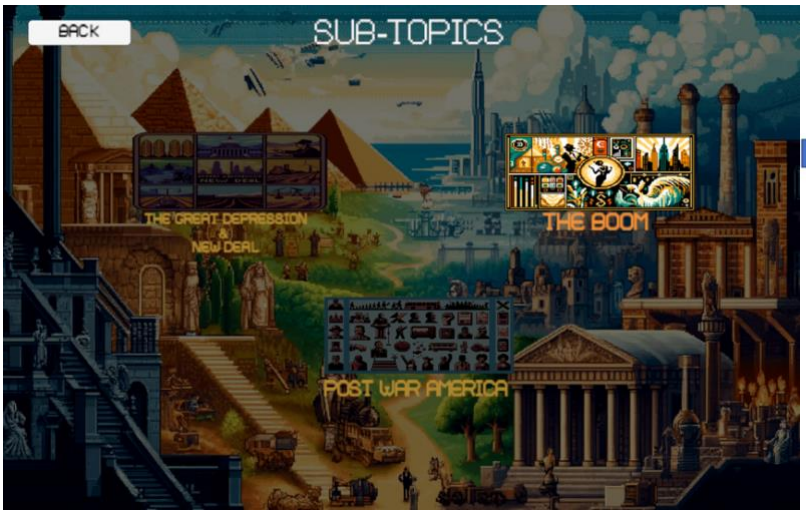


Figure 14: Topic Selection Menu



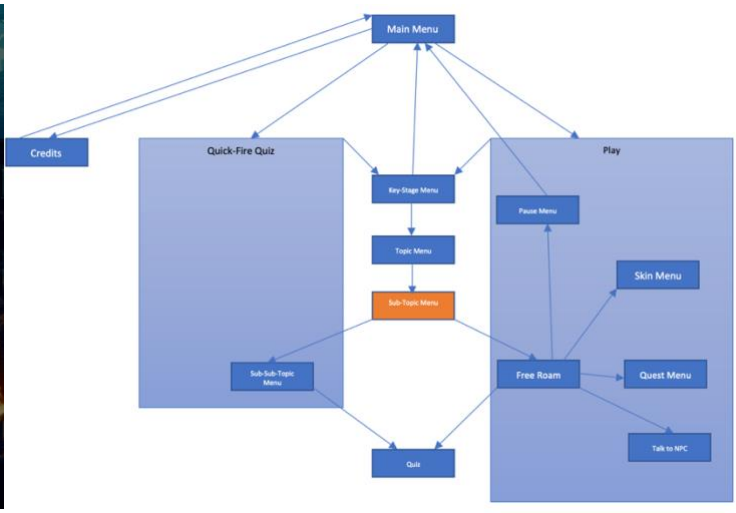
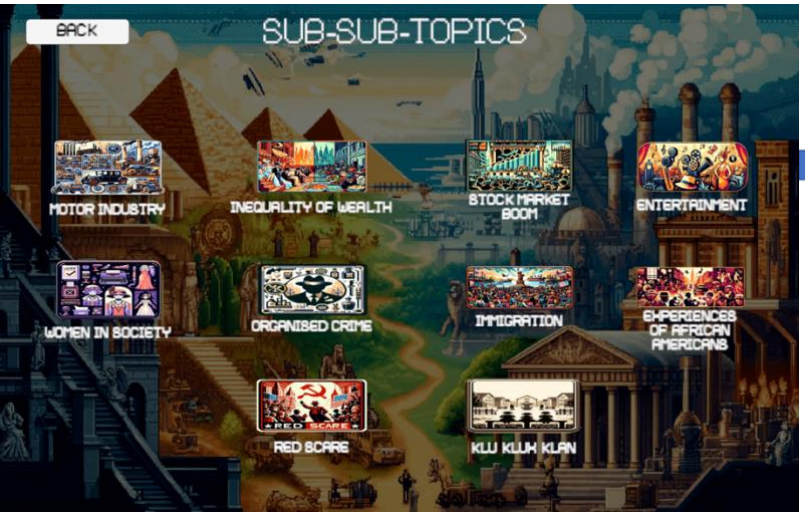


Figure 15:Sub-Topic selection menu

Figures 14 and 15 show the game's layered navigation system, designed to guide users through a refined selection process down to the most specific topics.

The Topic Selection Menu (Figure 14) presents the various topics that are in the educational curriculum for that key stage. Upon a choice being made, the Sub-Topic Selection Menu (Figure 15) further narrows the focus, breaking it down into specific events within the chosen period.



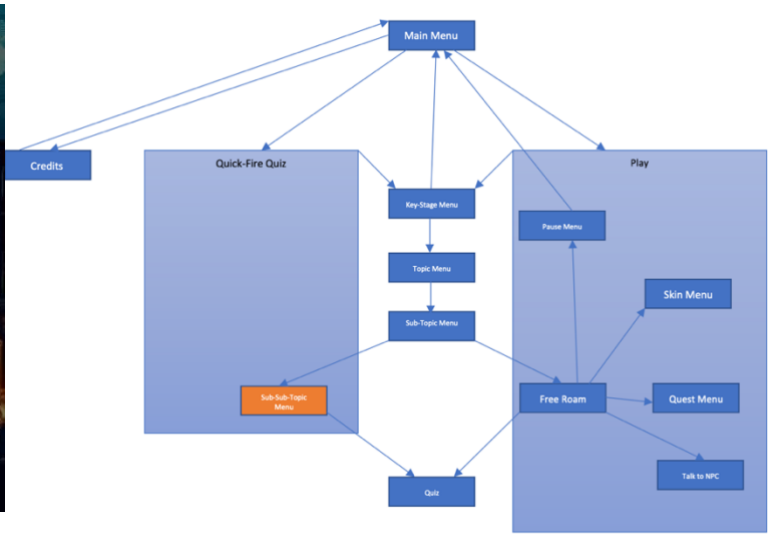


Figure 16: Sub-Sub-Topic selection menu, only applicable to Quick Fire Quiz

For the “Quick-Fire Quiz” part of my game, I have given users the option to filter down to sub-sub-topics, as shown in Figure 15. This is to enhance user experience completely and offer the user a personalised experience. For example, if the user is wanted to be tested on a specific part of a topic this option will allow users to do just that.

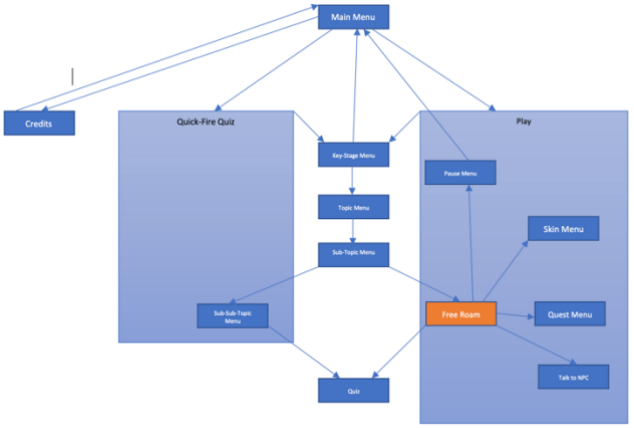
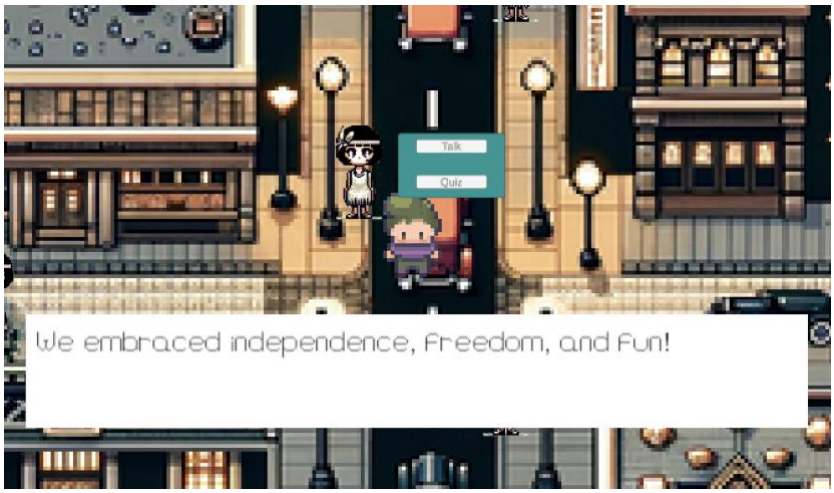


Figure 17: Screenshot of my game that shows the free roam aspect

This screenshot in Figure 17 resembles streets from the roaring 1920s, featuring buildings that are made to be speakeasies as well as iconic flappers, each poised to teach unique information about themselves. Through engaging interactions with these characters, players are introduced to the diverse aspects of flapper culture, from fashion and music to the broader social and political changes of the time.



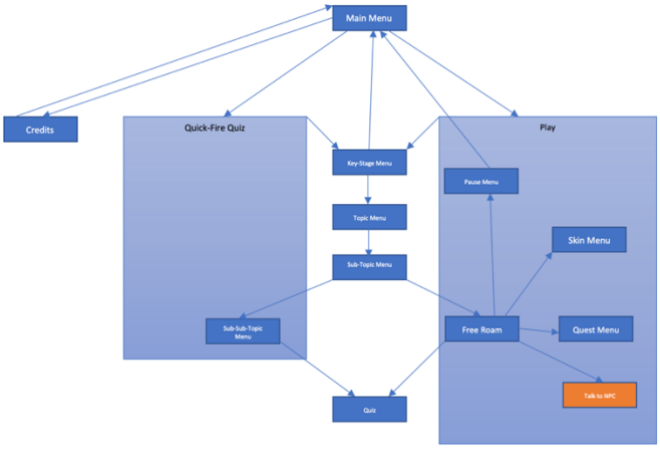


Figure 18: A screenshot from my game that shows the user talking to a flapper

Figure 18 shows a screenshot from my game where the user is interacting and talking to a flapper. This part of the game allows players to learn about the 1920s from the flappers' perspective, diving into their lifestyles, beliefs, and the social changes they were a part of. This is thoughtfully implemented to make it look like the user is living through the eras and talking to a flapper as if they were real life conversations. It's a fun and interactive way to explore history, that allows the user to learn at their own pace.

The textual content within the dialogue and on-screen prompts part of the game, uses the 'Hana Pixel Font' (Corgi, 2015) sourced from the Unity Asset Store. This particular font was chosen for its vintage RPG styled aesthetic. Its pixelated style enhances the game's retro ambiance, aligning seamlessly with the 1920s setting. The use of this asset is strictly for aesthetic purposes and does not provide any benefits to the users learning experience.

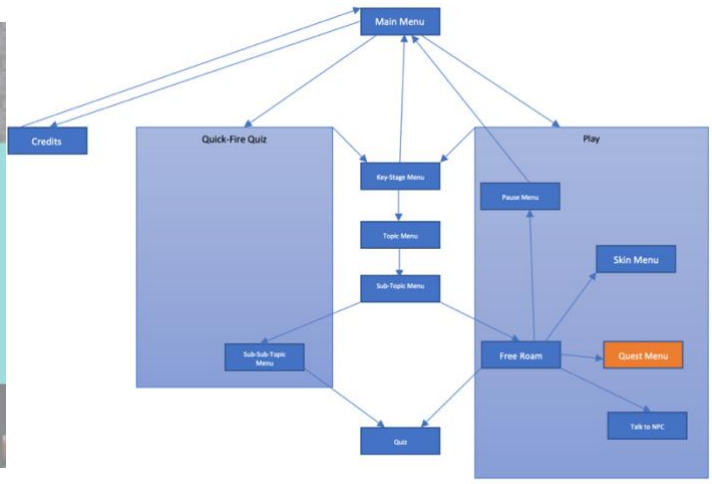


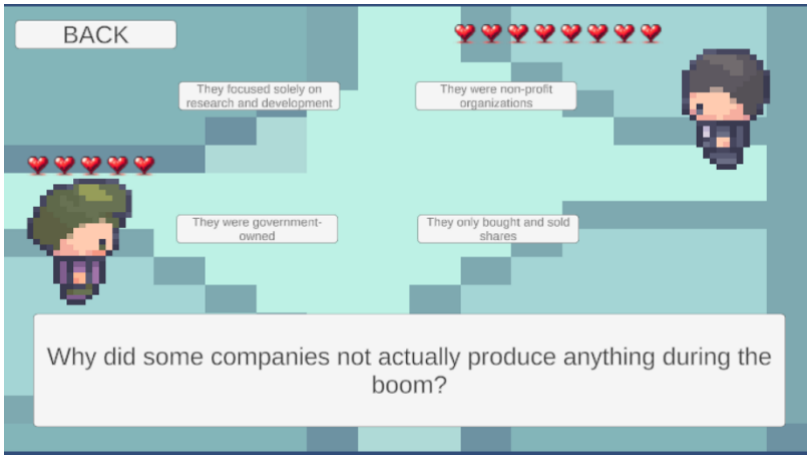
Figure 19: A screenshot from my game that shows the Quest Menu

The screenshot depicted in Figure 19 captures the menu from the 'Quest' feature of 'ProjectHistory'. Here the user is given the option to select which topic they would like to learn. When a player initiates a quest, they are seamlessly transported to the relevant historical location, ensuring immediate engagement with the task at hand. As shown in figure 20, the designated quest area is marked by a green overlay, guiding players to the point of their mission. Furthermore, the quest's objectives are conveniently displayed in the top left corner of the screen, indicating NPC's the player must interact with to progress.

Figure 20: A Screenshot from my game that shows the "Red Scare" Quest in action

This design is implemented with the user's convenience in mind. Instant transportation to quest locations mitigates any potential navigation challenges across the game's map, benefiting those who may find map traversal daunting. The visual cues provided by the green highlighting serve to reinforce the player's understanding that all necessary components to complete the quest are within this zone.

The quests in 'ProjectHistory' are thoughtfully crafted educational tools, purposed to bolster the user's comprehension of specific historical topics, particularly those they may find challenging. Unlike traditional teaching methods, these quests were made, aiming to facilitate learning in an interactive and engaging setting. Players are encouraged to undertake the games quizzes at their own pace, with quests serving as a mechanism to educate, engage, and enrich the player.



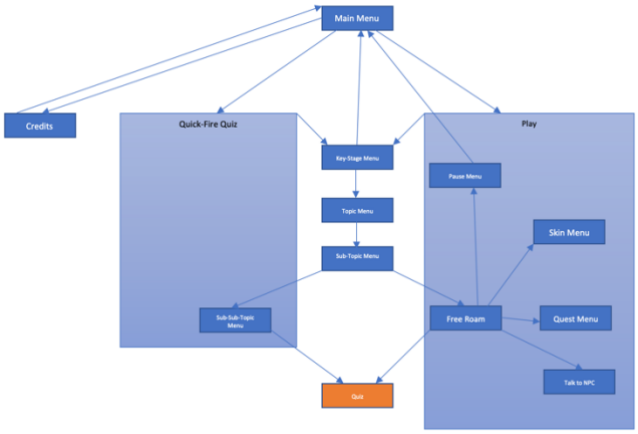


Figure 21: A Screenshot from my game that shows the Quiz aspect

Figure 21 presents a screenshot from the game's quiz feature. This interactive module is designed to evaluate and reinforce the player's retention of historical knowledge acquired throughout the gameplay. It effectively deepens the player's understanding of the era by challenging them to recall specific details and contextual information.

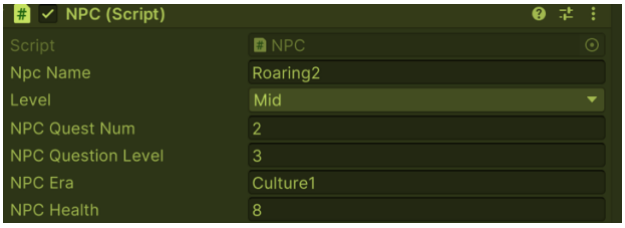


Figure 22: The NPCs variables set in the editor

Additionally, the quiz incorporates a life system to heighten engagement and add educational value. Players are permitted up to five incorrect answers before they must restart the quiz, fostering learning through repetition and correction. The complexity of the quiz varies with the NPC's level low, medium, or high requiring players to answer five, eight, or twelve questions correctly, respectively, to succeed. This tiered difficulty system ensures that the quizzes cater to different levels of knowledge and learning paces, making the educational experience both challenging and accessible.

Furthermore, each NPC is associated with a designated question level 1, 2, or 3 which determines the difficulty of the questions drawn from the question pool. Level 1 represents the easiest tier, providing foundational questions that help solidify basic understanding, while levels 2 and 3 progressively introduce more complex and challenging question. Level 3 is the most difficult, designed to test deeper knowledge of the historical content. Setting my game up like this not only tailors the difficulty to match the player's learning curve but also enhances the educational depth of each NPC interaction within the game.

Chapter 5: **Testing**

This section of the report systematically examines the functionality and performance of the game through detailed test cases. It provides a structured testing approach used to validate each game feature against its intended objectives, ensuring that the game meets technical standards.

5.1 Testing Table

Table 2: Test Cases for 'ProjectHistory' Game Features

Test Case	Test Description	Objective Alignment	Expected Outcome	Actual Outcome	Pass/Fail
1	Content Alignment	To check the game's historical content against curriculum standards.	Game content aligns with GCSE history curriculum objectives. (As only GCSE completed)	Content Aligned with AQA GCSE curriculum for topic America Opportunity and Inequality	Pass
2	Movement Controls	To check whether the games movement and interaction controls work	'W' should make the player move up, 'A' should make the player move left, 'S' should make the player move down and 'D' should make the player move right.	Movement works just as expected	Pass
3	Quest Menu	To check Quest menu works correctly	When selecting one of the quest choices you should be teleported to that location of the quest, a green highlighted box should show up around the quest area and it should say who you need to talk to.	Quest Menu works correctly, just how the expected outcome describes it	Pass
4	Quest System	To check Quest system updates correctly	When talking to a required NPC in the quest the quest box should update with who you have talked to and who	Quest System works correctly, just how the expected outcome describes it	Pass

			else is left to talk to. After you have talked to everyone you needed to, the green box and the box that says who you need to talk to should disappear		
5	Talk System	To validate whether the talk system works correctly	Click Talk on an NPC should make a talk box appear at the bottom with text as if the NPC is talking to the player	Talk System works as described in expected outcome.	Pass
6	Talk Display	To ensure that the text during the talk function is displayed correctly	The info displayed when the user has clicked talk should all be contained in that white text box and should not leak. This is to ensure users can read it with ease as this is how they will learn	Mostly works, some NPC's with longer scripts cause the text to overlap in the text box, making it difficult to read *Now fixed, works as expected	Pass
7	Quiz Display	To ensure the quiz display operates smoothly and mimics the intended Pokémon battle style.	Quiz Display function without glitches, with questions and answers displaying correctly.	Quiz Battles operate smoothly and correctly question and options are displayed correctly, but options that are slightly longer are overgrowing the box making text go outside the intended box	Pass
8	Correct Answer Validation	To validate the game's response to correct answers in the quiz battle.	Correct answers are recognised by the system, and appropriate rewards or progress is granted.	Works exactly as expected outcome describes it	Pass

9	incorrect Answer Handling	To check the quiz' consequences when incorrect answers are selected.	Incorrect answers lead to a heart being removed from the user but the question still not changing giving user an opportunity to select the right one	Works exactly as expected outcome describes it.	Pass
10	Quiz Reward System	To check whether players get rewarded for completing quizzes	After completing a certain number of quizzes for a topic the player should get a cosmetic reward based on the topic, they have completed.	Works exactly as outcome describes it, for example completing 3 flapper quizzes will unlock the flapper skin in game.	Pass
11	Quiz Difficulty Scaling	To ensure that all quizzes are not the same difficulty	Setting the NPC question level to a higher number in the unity editor, should result in harder questions being displayed in the quiz	Works as expected, setting the variable NPC question level to higher value from :1,2,3 resulted in more difficult questions being added to the question pool.	Pass

Chapter 6: **Conclusion**

This final section discusses the outcomes of the project against its original objectives, detailing both successes and areas for improvement. It includes a reflective assessment of what was learned during the development process, discusses the challenges faced, and proposes future enhancements, providing a comprehensive evaluation.

6.1 Evaluation against objectives

Table 3: Evaluation of project against objectives

Objective	Evaluation	Success/Failure
Research about different Learning Styles	Research was carried out on the VARK (Visual, Auditory, Reading/Writing, and Kinesthetic) learning styles, to assess the effectiveness of the model's integration into education. The results of this study showed an enhancement in student engagement levels, indicating that the incorporation of the VARK model can significantly improve the learning experience.	Success
Develop an Educational History RPG Game	The project successfully developed a fully functional Educational History RPG Game, which allows players to explore historical eras through interactive gameplay. The game was completed with integrated quizzes, quests, and character interactions, all within a historically accurate environment, providing a solid foundation for educational engagement.	Success
Address Diverse Learning Styles	The game was designed to cater to various learning styles by including visual, verbal, and kinesthetic elements. The project being a hands-on game benefits kinesthetic learners,	Success

	furthermore players can converse (text based) with characters about historical events and walk around the map seeing environments and people just as they would have been during that era, which helps accommodate different learning preferences and needs.	
Integrate Existing Curriculum	The game currently aligns with the AQA GCSE History curriculum and for the sake of the project, more specifically the "America: Opportunity and Inequality" part of the curriculum. I intentionally focused on specific historical eras and events that are commonly taught in schools and appear in exams.	Success

6.2 What I learnt

In this project, I've learned a lot about how to make learning history fun through a game. Creating a game that's both enjoyable to play and educational was crucial for me. I've gotten better at researching and making sure the game's content fits the history curriculum and is adaptable to different learning styles. I've also improved my skills in coding and designing a game, especially using Unity, and managing a database with SQL to hosts the game's quizzes.

In Addition to this, I dedicated time to understanding various educational theories and the concept that individual learning styles vary significantly from person to person. This recognition of diverse learning preferences was a critical feature that I incorporated into my game design. By integrating both visual and text-based elements, the game caters to multiple learning methods, accommodating those who absorb information visually as well as those who benefit from reading.

One of the best parts was figuring out how to turn historical facts into something that feels like conversations with people from that time. It'll be great to see how this approach helps players remember historical details.

6.3 Challenges I Faced

One significant challenge in this project was the integration of databases with Unity. While Unity excels at game development, it isn't inherently designed for complex database management. After weeks of intensive research, I was able to figure out a way to implement a way to incorporate databases into unity. Being taught this in a module in my previous years, I used XAMPP to create an Apache Web server and hosted my databases on there using PhpMyAdmin. I explained earlier how I integrated this into my game.

Another substantial hurdle was ensuring the historical accuracy of the content while aligning it with the AQA GCSE curriculum. Sourcing reliable historical information to develop both the quiz questions and the NPC chat dialogues was a task that required a lot of research. Finding resources that were both credible and pertinent to the curriculum involved checking multiple sources to confirm the accuracy and relevance of the content.

6.4 Future Improvements

With additional time, or beyond the current project timeline, I would consider:

Developing a personalised profile system that records user progress. This feature would enable players to save their in-game achievements and quiz results to a profile accessible with a username and password. It would provide a continuous learning experience, allowing users to pick up where they left off and track their educational journey.

Producing original art assets. Currently, I have used AI-generated visuals to create historically accurate characters and environments that align with the AQA GCSE curriculum. While AI offers efficiency and a foundational visual reference, it limits creative control. The AI-generated art is a temporary solution to meet project deadlines. For a published version of the game, I envision incorporating my own artwork into the game.

Including a way that auditory learners can use to benefit from the game. This could be adding a voice recording to each NPC dialogues or incorporating a text to speech API, so that there will be another way to learn added into the game along with text-based, visual, and hands-on learning.

Expanding the game to facilitate the entire GCSE syllabus, along with Key Stages 1-3 curriculum. Given more development time, this expansion would transform the game into a complete educational platform, offering a robust tool for learning and revision across a broader range of history education.

Chapter 7: **Bibliography**

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