May 27th 2024

DESIGN PROCESS REPORT

GRADUATION PROJECT

KEVIN HOFBAUER
427740
Client: University of Groningen,
Department of Archaeology

Communication & Multimedia Design, Game Design

Design Process Report

Graduation Project

For

University of Groningen

Department of Archaeology

Author: Kevin Hofbauer

Student Number: 427740

Class: CMV4B

Programme: Communication & Multimedia Design

Major: Game Design

Course: Graduation Project CMD

Course: Graduation Project CMD – CMVB17ASO

Graduation Supervisor: Rick de Klerk

Second Assessor: Ivan Steenstra

Direct Client: Stijn Arnoldussen

Date of publication: May 27th 2024

Place: Groningen, The Netherlands

Summary

Summary of the report in 1-2 pages

Preface

Table of Contents

1. Introduction

This report informs the reader about the

2. Project Framework

2.1. Client Description

Client Organization:

The client organization, the Department of Archaeology at the University of Groningen (GIA), is dedicated to advancing archaeological education and research. Their core activities involve offering academic programs in archaeology, focusing on historical research, fieldwork, and cultural heritage preservation. GIA collaborates with key scientific partners of international standing and maintains collections in archaeobotanical and archaeozoology.

Key Activities of the Department:

Raemaekers (2022) highlights the following key activities of The Department of Archaeology in 2021 in the annual GIA report:

- Offering academic programs in archaeology, focusing on historical research, fieldwork, and cultural heritage preservation.
- Conducting fieldwork projects both in the Netherlands and abroad, with a focus on specialized areas such as bioarchaeology and mortuary archaeology.
- Obtaining major research grants and maintaining a high output level in terms of research publications.
- Engaging in societal outreach activities to communicate research findings and collaborate with stakeholders, including government agencies, museums, and local volunteers.

Direct supervisor:

My direct external supervisor, Dr. Stijn Arnoldussen, is a Lecturer specializing in later prehistory and serves as the field school director at the Department of Archaeology. He supervises first-year field school training and is responsible for Field School 1, a month-long excavation for first-year students. This excavation is part of the "Archaeological Fieldwork" course (LPX012P10), which is taught in the last block of the first year. The course focuses on teaching excavation skills, including land surveying, archaeological drafting, paedology, and report compilation. Under Dr. Arnoldussen's supervision, students learn practical archaeological excavation techniques and how to compile excavation reports based on their own fieldwork experience (*Archaeological Fieldwork*, n.d.). He is my direct supervisor because of his expertise in fieldwork and his experience in teaching students. Participating in hands-on fieldwork provided him with valuable insights into what students are struggling with and what their needs are.

2.2. Target audience

The primary target audience for this educational game consists of first-year archaeology students between the ages of 18 and 25, enrolled in the “Archaeological Fieldwork” course offered in block 4 of their academic program (University of Groningen, n.d.). As studenty typically have no prior experience with archaeological fieldwork, the game is designed to help them gain basic knowledge.

In their first year, students follow a structured curriculum that introduces them to the fundamentals of archaeology, including theoretical concepts and historical contexts (*Archaeological Fieldwork*, n.d.). However, when they begin their fieldwork course in block 4, many students lack practical experience and knowledge of excavation procedures and instruments. Therefore, the game serves as a preparatory tool, providing students with a basic understanding of the excavation process and the steps involved, so that teachers can focus more complex areas within classes.

The game is designed to be used as homework in preparation for fieldwork classes. Teachers can assign specific levels of the game to be completed before the next class, ensuring that students arrive prepared and ready to engage with more advanced concepts and discussions during the course. This approach not only enhances student learning but also optimizes classroom time by reducing the need for lengthy introductory explanations.

In addition to this, the client also intends to use the game during open days to showcase it to prospective students. They will, however, not play a big role in the research and evaluation of this project, as they are only the secondary target audience. Furthermore, due to time constraints, it has been decided to focus all resources on meeting the needs of current first year students. Lastly, these students typically share the same demographic as current students, in terms of game knowledge, likely resulting in similar needs.

2.3. Problem Context

This graduation project aims to address specific challenges faced by first-year archaeology students, including the lack of practical fieldwork experience and the time-consuming nature of initial fieldwork course explanations. By developing an immersive, digital platform, this project seeks to replicate various stages of an archaeological expedition, offering students a safe and realistic simulated environment. This platform provides hands-on learning experiences without the risks associated with actual excavation sites, such as damaging the site and historical artifacts, a concern given the

inherently destructive nature of excavation. Moreover, the platform aims to address resource constraints by eliminating the need for extensive time and financial investments required to organize traditional excavation experiences. Through interactive modules and scenarios, students can gain a basic understanding of excavation techniques, navigate challenges, and make mistakes while adhering to ethical principles and preserving archaeological heritage. This initiative not only responds to the critical need for practical skill development in archaeology but also leverages technological advancements to meet the growing demand for engaging and experiential learning methodologies.

2.4. Design Opportunity

The current educational landscape for first-year archaeology students presents a significant challenge in bridging the gap between theoretical knowledge and practical fieldwork experience. The absence of hands-on excavation opportunities inhibits students from acquiring essential skills, thereby hindering their ability to apply theoretical concepts in real-world contexts. Moreover, the inherently destructive nature of excavation practices poses ethical and practical concerns, limiting opportunities for on-site learning without endangering archaeological heritage. Additionally, it is difficult to ensure the participation of all students in traditional excavation experiences due to financial limitations and time constraints.

2.5. Design challenge

The design challenge of this project is to create an immersive educational game that lets archaeology students perform virtual excavations, including both practical fieldwork and organizational tasks. The game should cater to students with varying levels of knowledge and gaming experience, ensuring an inclusive learning experience. In addition to providing hands-on practice, the game should prioritize immersive design elements, incorporating realistic simulation and engaging user interface (UI) and user experience (UX) design to enhance learning of archaeological concepts.

2.6. Key concepts and research questions

K1 – Needs and challenges of archaeology students:

- R1 – What are the specific educational needs and challenges faced by first-year students in the context of fieldwork?
- R2 – What are the preferred learning styles and behaviours of first-year students in the context of archaeological education?

K2 – Gamified and simulated learning experiences for archaeology:

- R3 – What specific features and educational strategies contribute to the success of gamified and simulated learning experiences in other fields?
- R4 – How can the integration of gamified and simulated learning experiences cater to the learning preferences and behaviours of first-year students in archaeology education?
- R5 – To what extend does hands-on practice in a simulated environment enhance students' understanding and retention of archaeological concepts?

K3 – Simulation and immersive learning:

- R6 – What are the key elements required to create a realistic simulation of archaeological excavation processes?
- R7 – What are the key principles and techniques for creating realistic 3D art that enhances immersion and educational value in games?
- R8 – How can realistic sound be integrated into Unity to enhance the immersive learning experience in archaeological education games?

K4 – User interface (UI) and user experience (UX) design in educational games:

- R9 – What are the key principles of UI/UX design that can enhance the accessibility and usability of educational games for first-year students with limited gaming experience?
- R10 – How can user-friendly UI elements, such as intuitive navigation, clear instructions, and responsive layout, be effectively implemented in Unity to improve learning outcomes and user satisfaction?

3. Prototype

A description of the (concept) prototype in images and text (once two iterations have been carried out)

Underpinning of the prototype, whereby the iterations must be visible based on the design cycle. You will also explain here what you plan to do over the last few weeks of the graduation process (i.e. up to the exam presentation / final interview)

Also highlight immersive elements in the "prototype" part to explain why the prototype is like this -> this part is there to help the reader so they know what you are working towards

Display the prototype and tell what its about; also mention what went into this and why its is the way it is

Main purpose is to help the reader

4. Orientation and Understanding (A)

4.1. Research Methods

The following table shows the methods used to answer each research question. Clicking on a method leads to a detailed description of it in the research plan:

Research Questions	Methods
K1 – Needs and challenges in archaeology education	
R1 - What are the specific educational needs and challenges faced by first-year archaeology students in the context of fieldwork?	Survey Literature research
R2 - To what extent does hands-on practice in a simulated environment enhance students' understanding and retention of archaeological concepts?	Survey
K2 – Gamified and Simulated learning experiences	
R3 – What specific features and educational strategies contribute to the success of gamified and simulated learning experiences in other fields?	Trend analysis Competitive analysis Expert interview
R4 – How can the integration of gamified and simulated learning experiences cater to the learning preferences and behaviours of first-year students in archaeology education?	Literature research
R5 – To what extend does hands-on practice in a simulated environment enhance students' understanding and retention of archaeological concepts?	Pre-test/Post-test assessment 2-Group study Post-test interview
K3 – Immersive learning and archaeological accuracy	
R6 – What are the key elements required to create a realistic simulation of archaeological excavation processes?	Expert evaluation Usability testing Literature research
R7 – What are the key principles and techniques for creating realistic 3D art that enhances immersion and educational value in games?	Literature research Online courses and tutorials Usability testing
R8 – How can realistic sound be integrated into Unity to enhance the immersive learning experience in archaeological education games?	Online tutorials Usability testing
K4 – User interface (UI) and user experience (UX) design in educational games	

R9 – What are the key principles of UI/UX design that can enhance the accessibility and usability of educational games for first-year students with limited gaming experience?	Literature research
R10 – How can user-friendly UI elements, such as intuitive navigation, clear instructions, and responsive layout, be effectively implemented in Unity to improve learning outcomes and user satisfaction?	Online tutorials Usability testing

Table 1: Research Questions and Methods

➔ Add links to methods in appendix

➔ If there is something in the game, make a research question about it, so that you have a reason for it to be there and it can be graded; otherwise its nice to be there but doesn't add anything good to your grade

4.2. Research findings

The following section summarizes the findings of each key concept. Clicking on a question leads to the corresponding section in the research paper, where the conducted research for each method is answered in detail.

4.2.1. K1 – Needs and challenges in archaeology education

What are the specific educational needs and challenges faced by first-year archaeology students in the context of fieldwork?

What are the preferred learning styles and behaviours of first-year students in the context of archaeological education?

Struggles with fieldwork: Students have difficulties in maintaining an organized overview of site information, lack practical fieldwork experience, adherence to rules and protocols, and struggle with pottery categorization and other practical skills. Additionally, they express uncertainty in judgment and perfectionism, as well as challenges in interpreting stratigraphy and site layouts. Drawing accurate maps emerged as another obstacle, noted for its tediousness and potential for disorientation if not executed carefully. The theoretical aspects of archaeology courses were cited as challenging, alongside a lack of hands-on experience with real materials, hindering a full understanding of archaeological concepts. Lastly, navigating the complexity of laws and policies, particularly within the context of Dutch archaeology, was identified as a significant hurdle by some students. (*Link to appendix*)

Relevant study methods that can be applied into a game: Students overcome these struggles with repetition and by applying theoretical concepts into practice. They also engage in visual learning by watching educational videos and actively reviewing their notes from lectures. Moreover, participants emphasized the importance of hands-on learning experiences and practical application of theoretical knowledge. Incorporating elements such as repetition, practical application, theory application, and educational video consumption into the game could effectively engage players, enhancing learning outcomes. (*Link to appendix*)

Students' expectations from a game: The majority of students expressed a willingness to play the game as a way of both learning and entertainment. Many mentioned that it would help them in gaining a better understanding of excavation practices by facilitating memorization of steps and providing practical knowledge. Additionally, students identified specific skills that they believe a game could help them with, such as identifying structures and anomalies, understanding excavation order and field techniques, site interpretation, artifact recognition, and safety measures. Moreover, students also

expressed interest in learning about the organizational steps and paperwork. These findings underscore the potential of educational games to address the challenges faced by students in acquiring hands-on fieldwork experience and bridging the gap between theory and practice. (*Link to appendix*)

Action based on research results: Students are struggling with maintaining an organized overview of site information, lack of practical fieldwork experience, and difficulties in applying theoretical concepts into practice. Therefore, I will design a game that provides hands-on experience in all stages of the excavation process, offering repetition and practical application of theoretical knowledge. The game will also include elements such as educational videos, site interpretation, artifact recognition, and safety measures to enhance learning outcomes.

Design requirements taken from this research: FR6, FR7, FR8, FR9, QR5, QR6, QR7, and QR8.

4.2.2. K2 – Gamified and simulated learning experiences

What specific features and educational strategies contribute to the success of gamified and simulated learning experiences in other fields?

How can the integration of gamified and simulated learning experiences cater to the learning preferences and behaviours of first-year students in archaeology education?

Trend analysis: The trend analysis shows that simulator games show a strong trend of using a 3D first-person perspective, realistic art styles, and an availability on PC and other platforms. Educational elements were enhanced with detailed mechanics and interactions. According to the games' reviews (source), this was also liked by players, along with the relaxing sensation while playing. (*Link to appendix*)

Competitive analysis: The competitive analysis revealed that archaeological games tend to feature realistic art styles, a 3D third-person perspective, and availability on PC and other platforms. While some games provided surface level educational value, most were purely designed to entertain players. Steam reviews show that the most liked parts were the immersive gameplay experiences and stories (source). (*Link to appendix*)

Expert interview: An expert interview with a Euro Truck Simulator 2 player shows that simulation players enjoy the immersion and realism of these games, as well as the level of detail. This is due to the graphics, lighting, and sounds. They did, however, acknowledge areas for improvement in terms of AI, dynamic weather changes, and randomized elements. The also acknowledge that realistic games can help a lot with understanding and learning the fundamentals of the field it is about. (*Link to appendix*)

Desk Research: The desk research involved analysing an example game, LAVA, based on the archaeological excavation of a Byzantine basilica in Greece. LAVA provides opportunities for students to engage with excavation scenarios based on real-world data from any computer. The game, designed in 3D with a first-person perspective, allows students to gain an understanding of excavation work planning and execution while assuming managerial roles in the excavation process. Through stages such as proposal writing, site visits, budget allocation, excavation, and assessment, LAVA offers an immersive and educational experience in archaeology. The stages of the game were analysed to understand how it addresses barriers to student involvement and provides a realistic learning experience.

Action based on research results: Students prefer immersive and realistic gaming experiences with detailed mechanics and interactions. Therefore, the simulation will be designed with a 3D first-person perspective, realistic art styles, and availability on PC and other platforms. It will focus on providing immersive gameplay experiences and stories while incorporating detailed mechanics and interactions to enhance the educational value. Additionally, it will feature variety within the levels and immersive sounds to further enhance realism. Furthermore, the simulation will give feedback and provide explanations on how to perform tasks, ensuring a smooth and educational experience. By integrating these research-based strategies, it will offer an engaging, immersive, and educational experience in archaeology, catering to the preferences and behaviours of first-year students.

Design requirements taken from this research: FR1, FR2, FR3, FR4, FR5, QR1, QR2, QR3, and QR4.

4.2.3. K3 – Simulation and immersive learning

What are the key elements required to create a realistic simulation of archaeological excavation processes?

The research involved expert evaluation, desk research, and literature review. It identified key steps in the excavation process, including:

- **Informing the Ministry:** Ensuring compliance with local laws and regulations by informing the relevant ministry about the excavation.
- **Reporting to Archis:** Reporting the excavation to Archis, including the Programme of Requirements and Plan of Action, to document and archive the excavation data.
- **Excavating the Site:** Creating maps, establishing grid systems, conducting layered excavations, recording artifact locations, and adapting excavation techniques as required.
- **Cleaning and Cataloguing Artifacts:** Cleaning artifacts, conducting conservation treatments, sorting, marking, cross-mending, and systematically cataloguing artifacts.
- **Analysis and Interpretation:** Determining occupation periods, estimating the date of deposition, analysing manufacturing information, and interpreting excavation data.

To ensure the accurate representation of archaeological excavation processes in the simulation, all of these steps will be included in the concept. The game contents will also be evaluated by the client multiple times in different design stages, which can be seen in the meeting summaries, and in concept feedback summaries. The results of these can be seen in the final concept, Iteration 1, Iteration 4, and Iteration 6.

What are the key principles and techniques for creating realistic 3D art that enhances immersion and educational value in games?

How to resolve the problem of this question

- To create a realistic asset, texture it with substance painter

Research Question 3: What programming languages, frameworks, and development methodologies should be employed to ensure the user-friendliness and scalability of the digital platform for employer branding, while also facilitating effective employer branding assessments, data visualization, and recommendation generation?

OOP programming languages like Python and frameworks such as Flask are recommended, based on insights gathered from expert interviews. Adherence to SOLID principles and clean architecture, as discussed by Martin (2017) and Kleppmann (2017), enhances flexibility and scalability. Containerization using Docker and Kubernetes further bolsters these qualities. DevOps practices, as described by various sources, streamline development processes. Tools like Selenium aid in testing and monitoring. For database management, normalization techniques and robust backup strategies ensure data integrity and availability.

How can realistic sound be integrated into Unity to enhance the immersive learning experience in archaeological education games? (*link to appendix*)

Realistic sounds play a crucial role in enhancing the immersive learning experience in archaeological education games. With the help of desk research and online tutorials (*link to appendix*), multiple methods for integrating realistic sound into Unity were explored, such as how to add sound effects in general, (*link to appendix*) how to add footsteps (*link to appendix*), and how to add multiple sounds to one audio source (*link to appendix*).

It was also decided to add sound occlusion with a plugin called 'Steam Audio' (*link to appendix*) (Valve, n.d.), as this enhances realism in virtual 3D spaces.

4.2.4. K4 – User interface (UI) and user experience (UX) design in educational games

What are the key principles of UI/UX design that can enhance the accessibility and usability of educational games for first-year students with limited gaming experience?

Desk research found that an engaging narrative, often featuring a main hero, is important for keeping students interested (Chorianopoulos, Giannakos, & Chrisochoides, 2014). Using familiar game mechanics from popular video games helps students with limited gaming experience adapt to the gameplay more easily. Providing trial and error gameplay for learning encourages students to experiment and learn from their mistakes. Immediate feedback during gameplay creates a supportive learning environment and encourages active participation.

Moreover, according to Nielsen (1994), good UI/UX design should make sure that users always know what is happening in the game (system status visibility), they can control what they are doing (user control), everything looks and works the same way (consistency), mistakes are avoided (error prevention), and everything is easy to understand (easy recognition).

User Experience (UX) is dynamic and context-dependent, focusing on simplicity, elegance, and meeting users' needs without complications. A good UX incorporates human perception, emotions, preferences, behaviour, and achievements (Vlasenko et al., 2022). Minimalism in web design is a prevailing trend that enhances user experience by simplifying course interfaces.

Action based on research results:

Incorporating these findings, the educational game's UI/UX design will focus on creating an engaging narrative, using familiar game mechanics, and providing trial and error gameplay for learning. Immediate feedback during gameplay will be implemented to encourage active participation and facilitate a supportive learning environment. Additionally, the game's design will adhere to the principles outlined by Nielsen (1994), ensuring system status visibility, user control, consistency, error prevention, and easy recognition. This approach aims to improve the accessibility and usability of the educational game for first-year students with limited gaming experience.

Design requirements taken from this research: FR10, FR11, FR12, FR13, FR14, QR9, QR10, QR11, QR12, QR13, QR14

How can user-friendly UI elements, such as intuitive navigation, clear instructions, and responsive layout, be effectively implemented in Unity to improve learning outcomes and user satisfaction?

4.3. Models

4.3.1. Persona

Explanation: Developing a fictional representation of a typical user, including demographic information, behaviours, goals, and pain points.

Justification: Provides a clear understanding of the target audience's needs, preferences, and challenges. It helps in creating user-cantered designs by ensuring that the game addresses the specific requirements and motivations of the intended users.

➔ *How good is your persona with tech? What kind of games does she like (if any)? How does the persona give you direction for your game design? What are her expectations of her study program?*

Results: The User Persona below shows a typical archaeology student in her first year. While she has heard of some games, like the Assassin's Creed series, she does not have a lot of experience in playing games, which is why she is not familiar with most mechanics and controls. She also lacks experience in fieldwork, although she has a strong interest in it.

Based on this, the game should make sure to include simple mechanics and explain what players have to do in detail. It should also explain fieldwork concepts from the basics, to ensure that every student can understand and learn from it. As she is an Indiana Jones fan, the game will also include references about him, to increase her enjoyment in the game.

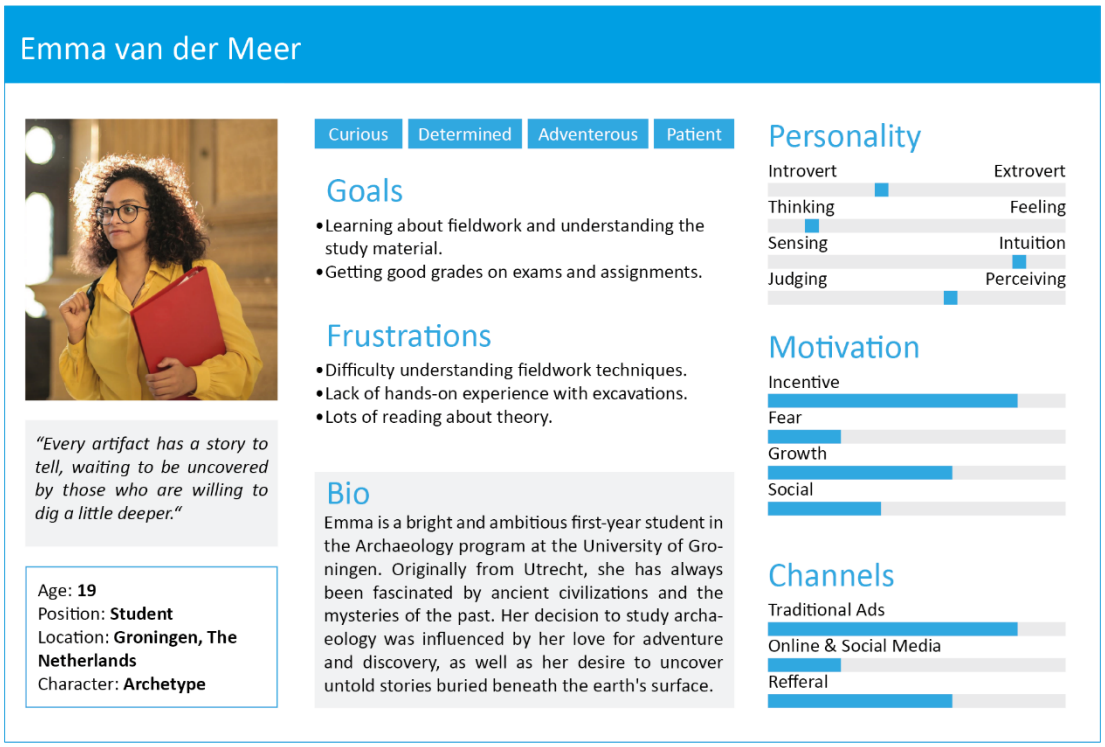


Figure 1: User Persona

PUT IN APPENDIX

4.3.2. Empathy map

Explanation: Creating a visual representation of a user's thoughts, feelings, actions, and pain points to empathize with their experience.

Justification: Helps in gaining deeper insights into the user's mindset, emotions, and behaviours. By empathizing with the user's perspective, designers can better understand their needs and design solutions that resonate with their experiences.

PUT IN APPENDIX

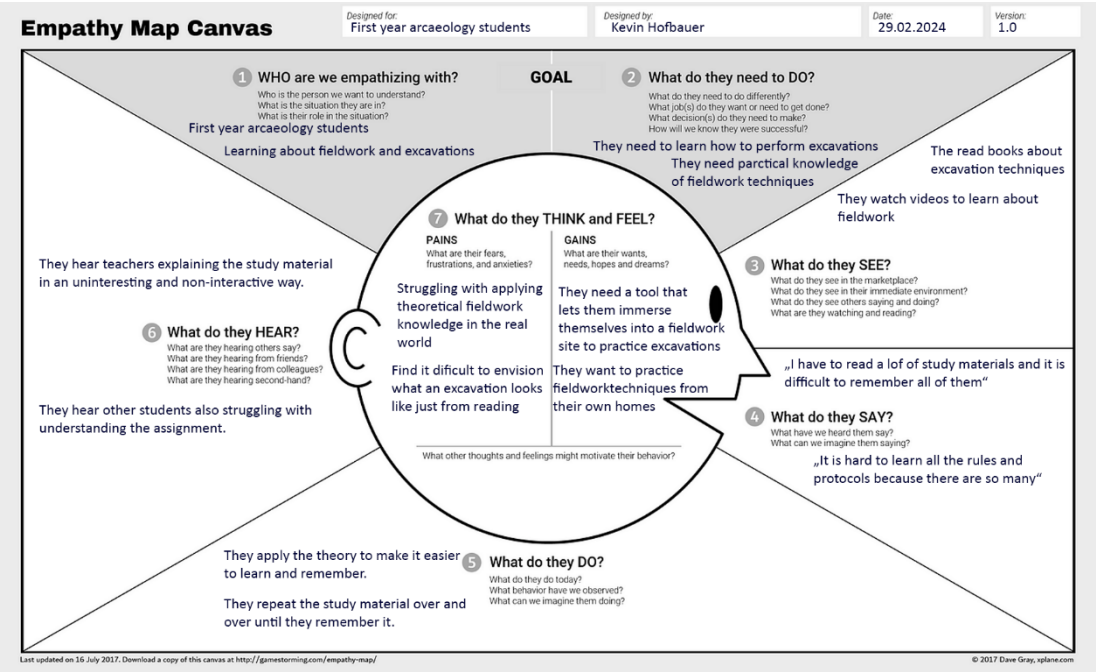


Figure 2: Empathy Map

4.3.3. Journey map

Explanation: Mapping out the user's journey from initial engagement with the game to completion of tasks, highlighting key touchpoints, emotions, and pain points along the way.

Justification: Provides a holistic view of the user's experience, allowing designers to identify opportunities for improvement and areas where the game can better meet user needs. It helps in designing a seamless and engaging user experience by addressing pain points and enhancing positive interactions throughout the user journey.

PUT IN APPENDIX

	Awareness	**Consideration**	**Onboarding**	**Active usage**	**Challenges**
Actions (What does the user do)	- Students are informed about the game by teachers - Prospective students see the game on open days	- Student researches the game by looking at pictures	- Student downloads the game and install it - Complete tutorials	- Student plays the game regularly - Completing levels and challenges	- Difficult levels - Technical bugs
Touchpoints (Channels where users engage with the tool)	- Teachers tell students to download the game as homework - They see a download page to the game on the university website	- Game download page/website - Classes - Teachers opinions	- Game download page/website - In-game tutorials	- The game itself (Interface, progress trackers)	- Trouble-shooting guides - Installation manual - FAQs within the game
Emotions (What is the user feeling)	- Curiosity - Interest - Anticipation	- Decision making - Trust building	- Anticipation - Excitement - Eagerness to learn	- Immersion - Satisfaction from progress - Occasional frustration during challenges	- Frustration - Confusion - Discourage-ment
Opportunities	- Include eye-catching visuals - Create informative and engaging announcement	- Highlight features and benefits - Showcase art style and screenshots	- Intuitive and appealing UI design - Clear walkthrough of the game - Clear instructions in the tutorial	- Useful and effective educational content - Appealing graphics and art style	- Provide hits or alternative strategies for overcoming difficult levels - Provide FAQs and manuals

Table 2: Journey Map

4.4. Design requirements

Based on all of the previously highlighted research, design requirements have been created to ensure a successful product. They were then split into the following two categories:

- **Functional Requirements:**
  Requirements that specify what the system should do. They describe the features and functionalities that the product must have to meet the users' needs. A list of all functional requirements can be found here. (*Rename to table x once table numbers have been finalized*)
- **Qualitative Requirements:**
  Requirements that focus on the user experience aspects of the product. They describe how the product should look, feel, and behave to meet the users' expectations. A list of all functional requirements can be found here. (*Rename to table x*)

The design requirements were then translated into design specifications. This helped to clearly define what the simulation should include and ensured that the final product meets the users' needs and expectations. The result of this can be found here. (*Rename to table x*)

They were then rated on priority using the MoSCoW method, based on desk research, client meetings, target audience research, and project time constraints.

For each phase of the design cycle a justification of and important results from your activities (f.e. research because that places in every phase)

➔ *Put pictures of all models in appendix (words in models also count to word limit*

- *Literature research*
- *Trend analysis*
- *Competitive analysis*
- *Stakeholder analysis*
    - *Student and Teacher Surveys*
    - *Persona*
    - *Empathy map*
    - *Journey map*
- *Expert Evaluation*

5. Conceptualization (B)

5.1. Ideation

The first step was to create a mind map in Figma to write down all kinds of possible ideas.

Explanation: Using a Figma canvas to write out all possible ideas. (Van Turnhout, 2015)

Justification: Allows for brainstorming of diverse concepts, encourages creativity, and provides a comprehensive list of potential project directions.

Results:

Table 3: Concept Ideation Results

The ideation resulted in eight different concept ideas, which were elaborated on in the next steps. Detailed descriptions of the concepts can be found here.

5.2. Sketching and OnePagers

Explanation: Making rough drawings or sketches translate concepts into visual designs. (Van Turnhout, 2015). These sketches were then put onto OnePagers, along with short descriptions, to be presented in a peer review in the next step.

Justification: Enables visualization of concepts, facilitates the process of gathering feedback from peers, and provides a presentation tool when communicating with the client.

Results:

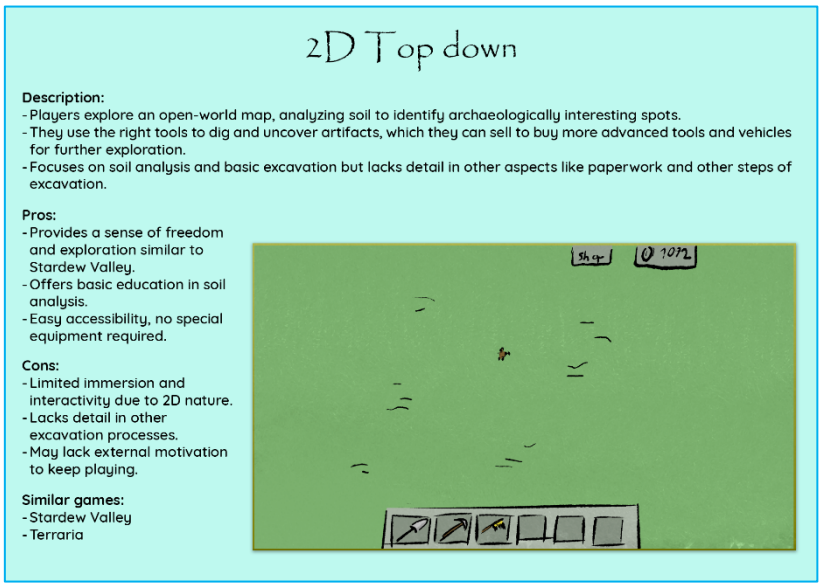


Figure 3: Concept One Pager - 2D Top down

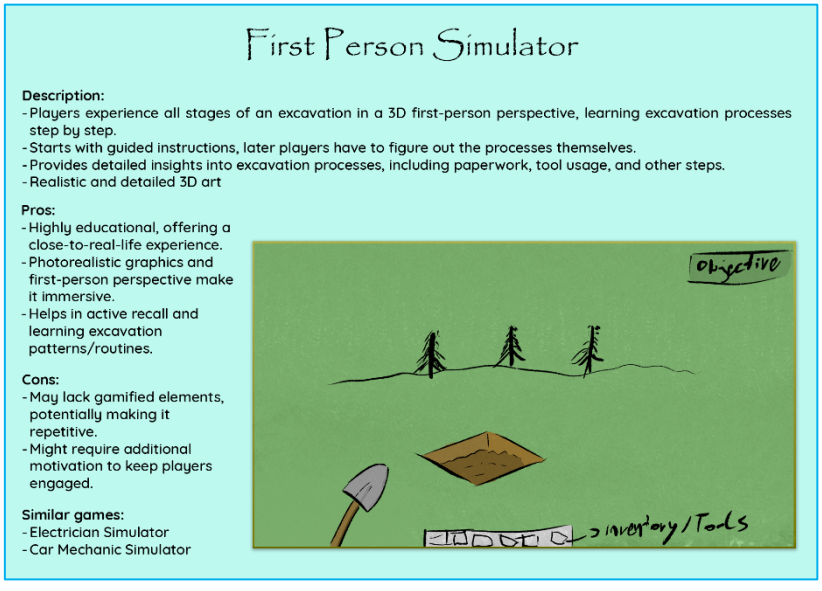


Figure 4: Concept One Pager - First Person Simulator

Real Time Strategy

Description:
- Players manage resources and deploy workers like excavators and photographers to perform excavations in different spots on the map.
- They sell discovered artifacts to hire new workers and buy better tools, improving efficiency and generating more income.
- Focuses on resource management and excavation but may lack detailed insight into the excavation process.

Pros:
- Similar to popular games like Age of Empires, attracting a broader audience.
- Provides a gaming experience while teaching excavation processes.

Cons:
- Risk of players getting lost in the game and forgetting educational content.
- Might not offer enough educational depth.

Similar games:
- Age of Empires
- Rise of Nations

Figure 5: Concept One Pager - Real Time Strategy

Singleplayer VR Experience

Description:
- Offers detailed instructions on fieldwork, teaching players how to use tools correctly through a VR simulation.
- Provides a detailed, step-by-step guide to excavation processes, including paperwork, tool usage, and other necessary steps.
- Photorealistic grpahics in Unreal Engine

Pros:
- Highly immersive and interactive.
- Offers a close-to-real-life experience.
- Detailed instructions suitable for individual learning.

Cons:
- Limited access due to the requirement of VR headsets.
- Time-consuming setup with controllers, etc.
- Not suitable for multiplayer experiences.

Similar games:
- Job Simulator
- I Expect You To Die

Figure 6: Concept One Pager - Singleplayer VR Experience

Multiplayer VR Experience

Description:
- Players perform excavations in teams of four, each taking on different roles like excavator, photographer, etc.
- They must work together to solve challenges and complete the excavation, providing a collective learning experience.

Pros:
- Highly immersive and interactive.
- Offers a close-to-real-life experience.
- Allows players to experience different roles.

Cons:
- Limited access due to the requirement of VR headsets.
- Difficult setup, especially for multiplayer experiences.
- Not suitable for individual learning.

Similar games:
- Keep Talking and Nobody Explodes
- The Diner Duo

Figure 7: Concept One Pager - Multiplayer VR Experience

5.3. Peer Review/Wizard of Oz

Explanation: Asking two peers for feedback to assess pros and cons of the concepts (Van Turnhout, 2015), *by sending them pictures of all one pages. The answers were then sent back in text form and summarized. The best concepts, based on the most pros, were then compared in the next step.* -> *by using wizard of oz and explaining the concepts*

Peer Review Justification: Peer review provides valuable insights, identifies potential blind spots in the concepts, and helps in prioritizing concepts based on feasibility, relevance, and potential impact. -> do the same for Wizard of Oz

Wizard of Oz Justification:

Results: The test results show that the First Person Simulator is the most promising for an archaeological excavation game. It offers high educational value and immersion. VR Multiplayer follows, providing collective learning experiences. Real-Time Strategy has potential but might distract from learning, while 2D Top-Down, reminiscent of popular games, lacks motivation (*Link to appendix*).

5.4. Concept comparison

Explanation: Comparing the most promising concepts from the peer review in the previous step based on different aspects and design requirements to evaluate their strengths and weaknesses. The raw data of the comparison can be found here (link to appendix).

Justification: Used to back up the findings from peer evaluation or to solidify the results by offering a structured framework for objective evaluation. This method guides informed decision-making and ensures alignment with project objectives and user needs.

Results:

	2D top down	First person simulator	Real-time strategy	VR Experience
Educational value	50% (4/8)	62,5% (5/8)	12,5% (1/8)	75% (6/8)
Immersion	50% (3/6)	100% (6/6)	33,3% (2/6)	66,7% (4/6)
Accessibility	100% (3/3)	100% (3/3)	66,7% (2/3)	33,3% (1/3)
Gameplay Mechanics	66,7% (4/6)	100% (3/6)	50% (3/6)	83,3% (5/6)
Feedback Mechanisms	100% (3/3)	100% (3/3)	66,7% (2/3)	100% (3/3)
Engagement	50% (5/6)	100% (3/6)	50% (3/6)	83,3% (5/6)
Realism/ Authenticity	40% (2/5)	100% (2/5)	20% (1/5)	80% (4/5)
Scalability	100% (1/1)	100% (1/1)	100% (1/1)	100% (1/1)
Replayability	50% (2/4)	75% (3/4)	50% (2/4)	75% (3/4)
Total	**64% (27/42)**	**90,5% (38/42)**	**40,5% (17/42)**	**76,2% (32/42)**

The table shows that the First Person Simulator was the most suitable option for this project, a more in-depth concept was created, where all stages of the game were explained, which can be found here. Once all stages were formulated, a flowchart and a PowerPoint with AI generated, and in Adobe XD iterated, visualizations were created to present the concept to the client.

5.5. Final concept

The individual stages of the game were taken from desk research about archaeological excavations (*link to research in appendix*), as well as client information and feedback (*link to appendix*). The concept was iterated several times, based on expert evaluation and client feedback (*link to appendix*).

5.6. Style guide

Style guide according to UI/UX research and keeping in mind target audience limited experience with games. Also based on mood boards of similar games (simulation genre) and theme (archaeology/adventure)

For each phase of the design cycle a justification of and important results from your activities (f.e. research because that places in every phase)

- *Description and visualization of final concept*
    - *Design requirements*
    - *One pager*
    - *Sketches*
    - *Feature list*
- *UX design*
    - *Flowchart*
    - *Adobe XD prototype*
- *UI design*
    - *Moodboards*
    - *Design boards (color palette, fonts, icons, etc.)*

6. Imagining & Prototyping (C)

6.1. Software

Before working on the main prototype, Adobe XD was used to create low-fidelity and high-fidelity mock-ups of the menu and the UI. This program also allowed the implementation of interactions, which was used for usability testing in Evaluation 1 and Evaluation 2.

Unity was chosen as the best tool to create the prototype in, as it is the most known game engine and free to use. This makes it easy for the client to find new developers to build onto the game, should they decide to continue with the project. Furthermore, Unity is more than capable of implementing all planned mechanics and achieving the desired art style. To facilitate the development process, several tutorials were used.

As research showed that immersion plays an important part in educational games, realistic 3D models and textures were created. These can be viewed here in detail (*link to appendix*).

The design choices within the prototype are based on the "Action based on research results" paragraphs in the research findings, as well as feedback from testers and the client.

Rewrite to this:

Moving into the prototyping phase, I started by organizing and downloading the technology stack needed for development.

Technology	Justification	Contribution to functionality and performance
Python	Research Question 3: Software Architecture	The primary programming language used for backend development, providing flexibility, ease of use, and a wide range of libraries for various functionalities.
HTML, CSS, Javascript	Research Question 3: Software Architecture	Used for frontend development to create the user interface and enhance interactivity, providing structure, styling,

6.2. Iteration 1

The first iteration is based on client feedback per email, which is summarized here. The first version of the level description, as well the second version of the concept art were sent to the client, which resulted in the following key changes:

- Informing the municipality and selecting the correct documents added
- Selecting the correct clothes was iterated upon
- Marking the location of a discovered artifact on a map (excavation plan) and take a photograph of the item while it is still in the ground
- Washing and drying the artifacts
- Show 3D render of the artifact
- Artifact is not added to the players office, as this is unrealistic; instead, a picture of it will hang on the office walls
- Small quiz at the end of the level to ask about the next step

Pictures of the iterated document can be found here. (link to appendix)

(ArchaeologyGameConcept_v4.pdf) -> add pictures of it at the end

This was discussed more in the following meeting and further adjustments were made:

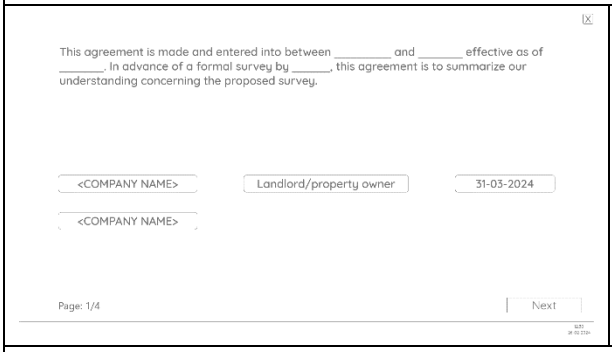
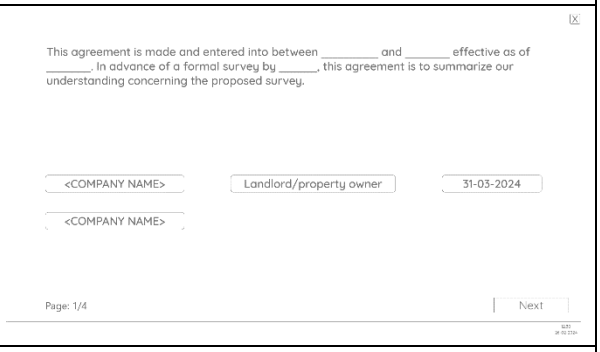
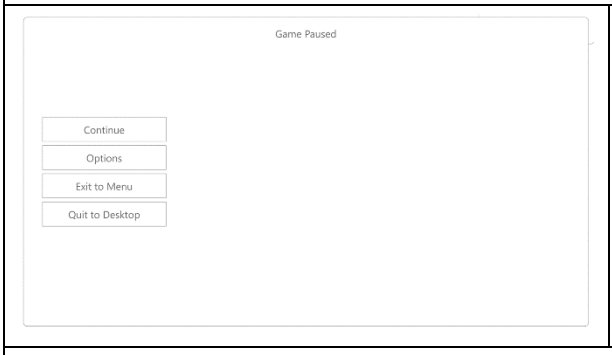
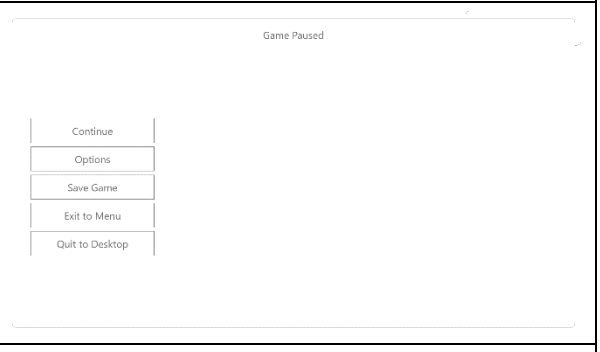
- Filling out the landlord agreement form was removed
- Plan of action was removed, as it is not really a plan of action, but more of an overview of the steps the player will take
- The player will only inform the municipality in the first level by sending the documents; filling out the documents will take place in future levels, so that the player does not have to take in too much information at once

The iterated document can be found here.

6.3. Iteration 2

The second iteration is based on peer review with two game design students, where I assessed the concept and the lo-fi Adobe XD prototype, which can be found here. Mainly changes in the UI of the menu, computer and site selection. Some changes in the concept include adding a tutorial at the beginning and providing clear and detailed instructions for actions and tasks in the game. A full summary of the provided feedback, as well as a list of changes can be found here. The following table shows a the most visible changes:

➔ Also add links/explanations for testing notes and test reflection

Before	After
	
Desktop icons	
	
Landlord agreement form (also for other pages)	
	
Pause menu save button	


New: Site picture zoom in function

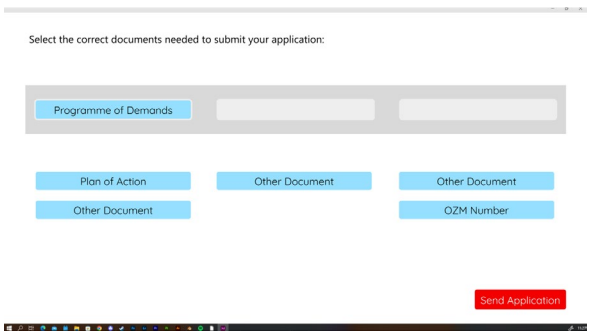
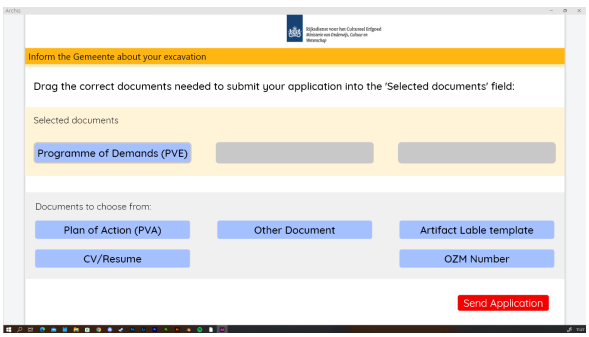
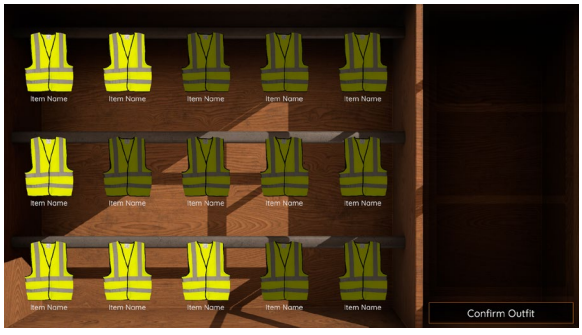
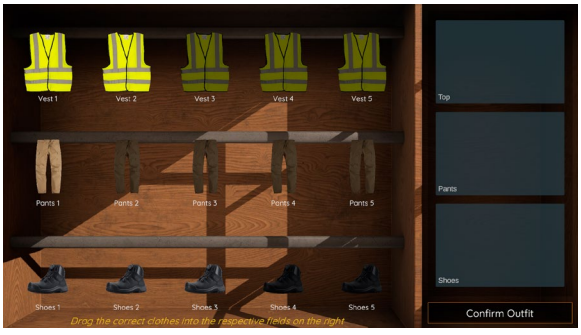
Table 4: Iteration 2 - Before and after comparison

6.4. Iteration 3

This iteration is based on a testing session with four peers, which can be found here. This led to improvements in the mechanics, such as not being able to interact with the computer or the closet, until the previous steps were completed. Some tasks are now also explained better and in more detail, such as the document submitting page – the game now explains that you have to drag the documents into the correct fields.

There were also some bugs that are now resolved, such as overlapping text with the dialogue field or the text ranging outside the box. A full list of iterations and a summary of the feedback that led to them can be found here (*link to appendix*).

The following table shows a before and after comparison of some elements:

Before	After
	
Forms submitting page (Archis)	
	
Computer background + icons	
	
Closet UI	

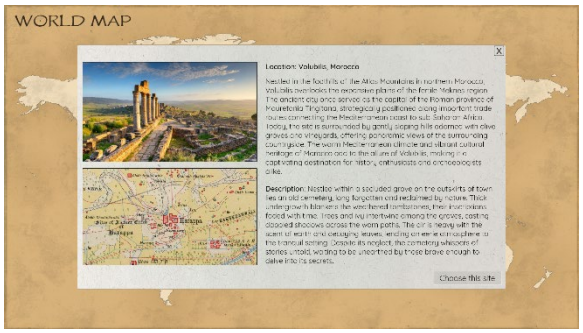
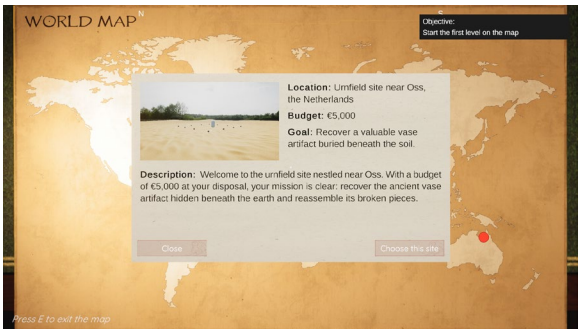
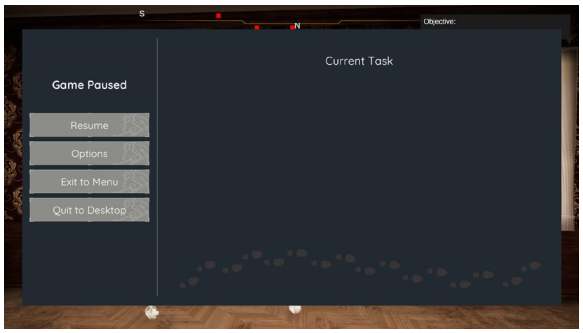
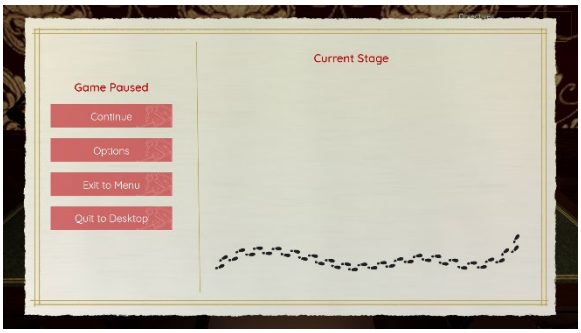
<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Site overview</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Pause menu</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Main menu picture and font</td></tr>
</table>

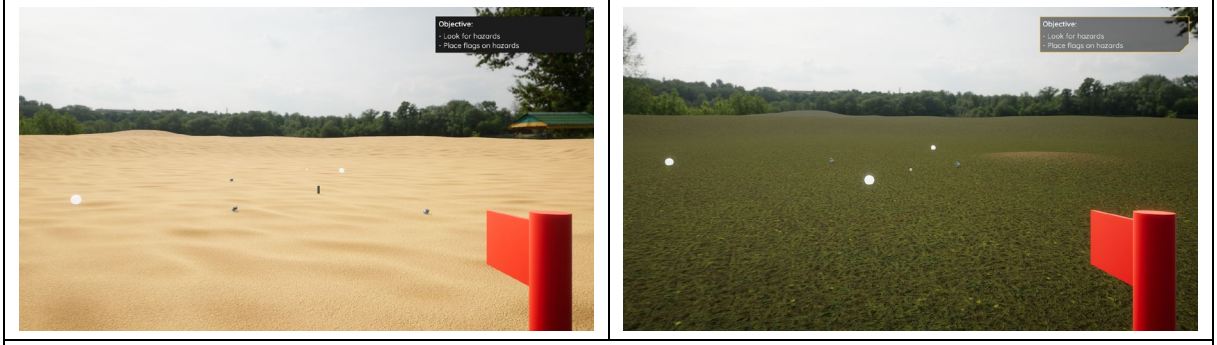
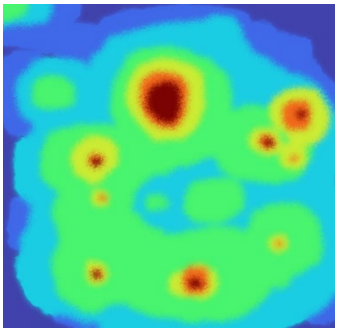
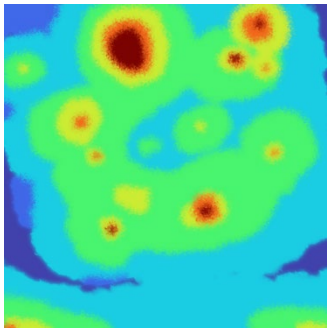
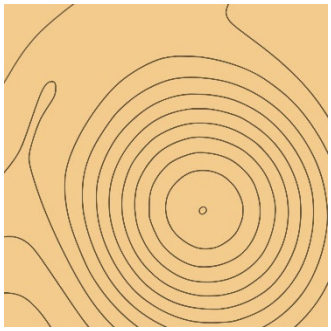
Table 5: Iteration 3 - Before and after comparison

6.5. Iteration 4

During a client meeting, the selection of the excavation area was discussed, which led to a change in the site environment. Instead of a dessert, the survey is located on a grass field, which allows for the following changes in the map analysis:

- The elevated spot in the ground is used to hide the artifact,
- An elevation in the ground leads to less grass being grown in the area, as it is further away from the ground water – this will be visible in the aerial photograph,
- The topographic map shows the height difference,
- The biggest spot in the ground radar scan results is used as a decoy to test students knowledge – to find the correct spot they have to look at all maps.

The summary of this meeting (meeting 4) can be found here (*link to appendix*). The following table show the before and after images:

<table>
<tr><th>Before</th><th>After</th></tr>
<tr><td colspan="2">  </td></tr>
<tr><td colspan="2">Excavation site ground and elevation changed</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Ground Radar Scan results adjusted to fit elevated spot</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td colspan="2">New: Topographic map</td></tr>
</table>

Grid resized to make it less repetitive	

Table 6: Iteration 4 - Before and after comparison

6.6. Iteration 5

The last iteration is based on testing with archaeology students and mainly consists of changes regarding their understanding of games and mechanics/interactions

- Making walking with W/A/S/D clearer and explaining it in the tutorial
- Fixing spelling mistakes
- Changing note interaction to not have to rotate it (it is difficult/annoying and the mechanism is never user in the game again)
- GRS text/explanation is a bit long and can be confusing -> make it shorter and more clear/simple
- Make map analysis clearer (instead of checkboxes, click on a certain map), and explain why the decoy is wrong
- Explain that the other excavation methods are out of budget
- Show where to excavate physically (also explain the orientation of the map (north south, etc.; and add the compass on the map to show north and south)

7. Evaluation (D)

7.1. Evaluation 1

The first quick evaluation tested the game concept, as well as the Adobe XD Lo-Fi prototype. This was conducted using peer review with three experts in the game design field, as they had the theoretical knowledge and ability to judge a game concept on scope and feasibility. Furthermore, they were able to evaluate the Lo-Fi Adobe XD prototype and recognize the wireframes and see the bigger picture behind them. While one was done in person, two were conducted on Microsoft Teams, as the testers were not in the Netherlands. The results led to iteration 2. A detailed list of iterations and tester feedback can be found here.

➔ Also reflect on the evaluation here and mention some of the methods

7.2. Evaluation 2

In the second test the Hi-Fi Adobe XD prototype was evaluated on aesthetics and usability, by following a testing plan. Furthermore, the first version of the Unity prototype was tested on aesthetics, usability, difficulty, mechanics, and bugs. This was also done with game design experts, as they were able to see how the complete version would look and therefore provide critical feedback. This has led to several iterations on both platforms, which are highlighted in iteration 3. A summary of the provided feedback and a fill list of iterations can be found here.

7.3. Evaluation 3

The third evaluation was done with archaeology students, as the game was in a presentable shape. Testers were asked to go through the Unity prototype and share their thoughts while playing.

7.4. Evaluation 4

Expert evaluation with client

Client also wanted to test if the game is breakable and look for bugs

Gave many suggestions to improve the interactions of the game (door) and how to make it more true to life (measuring tape, etc.), but also found a few bugs to fix

Iterations:

Expert evaluation

Showing the client my concept multiple times and asking for feedback on accuracy and if there is anything missing

First evaluation (Peer testing)

Adobe XD lo-fi testing and concept feedback

For each phase of the design cycle a justification of and important results from your activities (f.e. research because that places in every phase)

- *Testing plans*
- *User testing sessions*
- *Co-reflection*
- *Peer testing*
- *Expert evaluation*
- *A/B testing*
- *Pre/post test evaluation*

8. Recommendations and Iterations

Optional: chapter with recommendations and/or last iteration

Limitations

8.2. Limitations

The research conducted during the project is limited by few factors, such as technical limitations, target audience limitations and personal bias. The technical limitations mainly influence the implementation of the design requirements and as such, the prototype might not fully represent the all the design requirements equally. The target audience limitations come from the fact that most of the testers were within the same age group and were students of Hanze University. And finally, personal bias such as confirmation bias and selection bias might have interfered with the project. To mitigate that, peer reviews and collaborations with clients were done and a strict methodological approach was taken.

9. Sources

Andric, D. (2023a, February 4). *How many copies did Assassin's Creed sell? — 2024 statistics: A stab at understanding Assassin's Creed statistics*. Levvvel. Retrieved February 9, 2024, from https://levvvel.com/assassins-creed-statistics/

Andric, D. (2023b, February 10). *How many copies did Uncharted sell? — 2024 statistics*. Levvvel. Retrieved February 9, 2024, from https://levvvel.com/uncharted-statistics/

Archaeological Fieldwork. (n.d.). University of Groningen. https://ocasys.rug.nl/current/catalog/course/LPX012P10?legacy=true

Assassin's Creed® Odyssey. (n.d.-a). Steam. Retrieved February 9, 2024, from https://store.steampowered.com/app/812140/Assassins_Creed_Odyssey/

Assassin's Creed® Odyssey. (n.d.-b). PlayStation Store. Retrieved February 9, 2024, from https://store.playstation.com/en-gb/product/EP0001-CUSA09303_00-GAME000000000000

Assassin's Creed® Odyssey. (n.d.-c). Microsoft Xbox. Retrieved February 9, 2024, from https://www.xbox.com/en-us/games/store/assassins-creed-odyssey/bw9twc8l4jcs

Assassin's Creed® Origins. (n.d.-a). Steam. Retrieved February 9, 2024, from https://store.steampowered.com/app/582160/Assassins_Creed_Origins/

Assassin's Creed® Origins. (n.d.-b). Microsoft Xbox. Retrieved February 9, 2024, from https://www.xbox.com/en-us/games/store/assassins-creed-origins/bzgjrjc1fgf3

Assassin's Creed® Origins. (n.d.-c). PlayStation Store. Retrieved February 9, 2024, from https://store.playstation.com/en-gb/product/EP0001-CUSA05625_00-GAMEACEMPIRE0000

Boyan, Andy, and John L. Sherry. "The Challenge in Creating Games for Education: Aligning Mental Models with Game Models." *Child Development Perspectives*, vol. 5, no. 2, 10 May 2011, pp. 82–87, https://doi.org/10.1111/j.1750-8606.2011.00160.x

Car Mechanic Simulator 2021. (n.d.-a). Steam. Retrieved February 11, 2024, from https://store.steampowered.com/app/1190000/Car_Mechanic_Simulator_2021/

Car Mechanic Simulator 2021. (n.d.-b). Microsoft Xbox. Retrieved February 11, 2024, from https://www.xbox.com/en-us/games/store/car-mechanic-simulator-2021/9nh019zffhtv

Car Mechanic Simulator 2021. (n.d.-c). PlayStation Store. Retrieved February 11, 2024, from https://store.playstation.com/en-us/product/UP1564-PPSA02400_00-00CARMECHSIM2021

Car Mechanic Simulator 2021 - Steam Stats. (n.d.). Gamalytic. Retrieved February 11, 2024, from https://gamalytic.com/game/1190000

Core keeper. (n.d.). Steam. Retrieved February 9, 2024, from https://store.steampowered.com/app/1621690/Core_Keeper/

Core Keeper - Steam Stats. (n.d.). Video Game Insights. Retrieved February 9, 2024, from https://vginsights.com/game/1621690

Core Keeper Console announcement. (2023, November 14). *Twitter/X*. Retrieved February 9, 2024, from https://twitter.com/CoreKeeperGame/status/1724479927838196061

Electrician Simulator. (n.d.-a). Steam. Retrieved February 11, 2024, from https://store.steampowered.com/app/1080020/Electrician_Simulator/

Electrician Simulator. (n.d.-b). Nintendo. Retrieved February 11, 2024, from https://www.nintendo.com/us/store/products/electrician-simulator-switch/

Electrician Simulator. (n.d.-c). Microsoft Xbox. Retrieved February 11, 2024, from https://www.xbox.com/en-US/games/store/electrician-simulator/9nl56znv72wt

Electrician Simulator. (n.d.-d). PlayStation Store. Retrieved February 11, 2024, from https://store.playstation.com/en-us/product/UP8448-PPSA16248_00-0869329016266039

Electrician Simulator - Steam Stats. (n.d.). Video Game Insights. Retrieved February 11, 2024, from https://vginsights.com/game/1080020

Euro Truck Simulator 2. (n.d.). Steam. Retrieved February 13, 2024, from https://store.steampowered.com/app/227300/Euro_Truck_Simulator_2/

Euro Truck Simulator 2 - Steam Stats. (n.d.). Gamalytic. Retrieved February 13, 2024, from https://gamalytic.com/game/227300

Farming Simulator 22. (n.d.-a). Steam. Retrieved February 11, 2024, from https://store.steampowered.com/app/1248130/Farming_Simulator_22/

Farming Simulator 22. (n.d.-b). Microsoft Xbox. Retrieved February 11, 2024, from https://www.xbox.com/en-us/games/store/farming-simulator-22/9p6srw1hvw9k

Farming Simulator 22 - Steam Stats. (n.d.). Gamalytic. Retrieved February 11, 2024, from https://gamalytic.com/game/1248130

Farming Simulator 22 PS4 & PS5. (n.d.). PlayStation Store. Retrieved February 11, 2024, from https://store.playstation.com/en-us/product/UP4399-PPSA02426_00-1548339055872147

Heaven's Vault. (n.d.-a). PlayStation Store. Retrieved February 10, 2024, from https://store.playstation.com/en-gb/product/EP3273-CUSA11824_00-HEAVENSVAULTGAME

Heaven's Vault. (n.d.-b). Steam. Retrieved February 10, 2024, from https://store.steampowered.com/app/774201/Heavens_Vault/

Heaven's Vault. (n.d.-c). Nintendo. Retrieved February 10, 2024, from https://www.nintendo.co.uk/Games/Nintendo-Switch-download-software/Heaven-s-Vault-1892235.html

Heaven's Vault - Steam Stats. (n.d.). Video Game Insights. Retrieved February 10, 2024, from https://vginsights.com/game/774201

House Flipper 2. (n.d.-a). Steam. Retrieved February 11, 2024, from https://store.steampowered.com/app/1190970/House_Flipper_2/

House Flipper 2. (n.d.-b). Microsoft Xbox. Retrieved February 11, 2024, from https://www.xbox.com/en-us/games/store/house-flipper-2/9n67z2d5phw2

House Flipper 2. (n.d.-c). PlayStation Store. Retrieved February 11, 2024, from https://store.playstation.com/en-us/concept/10006545

House Flipper 2 - Steam Stats. (n.d.). Gamalytic. Retrieved February 11, 2024, from https://gamalytic.com/game/1190970

Konstantinos Chorianopoulos, Giannakos, M. N., & Nikos Chrisochoides. (2014). *Design Principles for Serious Games in Mathematics*. https://doi.org/10.1145/2645791.2645843

LEGO® Indiana Jones™: The Original Adventures. (n.d.). Steam. Retrieved February 10, 2024, from https://store.steampowered.com/app/32330/LEGO_Indiana_Jones_The_Original_Adventures/

Lego Indiana Jones: The Original Adventures. (n.d.). Lucasfilm Wiki. Retrieved February 10, 2024, from https://lucasfilm.fandom.com/wiki/Lego_Indiana_Jones:_The_Original_Adventures

Microsoft Flight Simulator. (n.d.). Microsoft Xbox. Retrieved February 13, 2024, from https://www.xbox.com/en-US/games/microsoft-flight-simulator

Microsoft Flight Simulator 40th Anniversary Edition. (n.d.). Steam. Retrieved February 13, 2024, from https://store.steampowered.com/app/1250410/Microsoft_Flight_Simulator_40th_Anniversary_Edition/

Microsoft Flight Simulator 40th Anniversary Edition - Steam Stats. (n.d.). Gamalytic. Retrieved February 13, 2024, from https://gamalytic.com/game/1250410

MoSCoW. (n.d.). Digital Society School. https://toolkits.dss.cloud/design/method-card/moscow/

Noblob. "How to Add FOOTSTEP SOUNDS in 2 MINUTES | Unity 3D." *YouTube*, 25 Apr. 2022, https://www.youtube.com/watch?v=A8AfFgOZvQ4&ab_channel=Noblob

Outer Wilds. (n.d.-a). Steam. Retrieved February 9, 2024, from https://store.steampowered.com/app/753640/Outer_Wilds/

Outer Wilds. (n.d.-b). Nintendo. Retrieved February 9, 2024, from https://www.nintendo.co.uk/Games/Nintendo-Switch-games/Outer-Wilds-1923577.html

Outer Wilds. (n.d.-c). Microsoft Xbox. Retrieved February 9, 2024, from https://www.xbox.com/en-US/games/store/Outer-Wilds/C596FKDKMQN7

Outer Wilds. (n.d.-d). PlayStation Store. Retrieved February 9, 2024, from https://store.playstation.com/en-gb/concept/229826

Outer Wilds - Steam Stats. (n.d.). Video Game Insights. Retrieved February 9, 2024, from https://vginsights.com/game/753640

Raemaekers, D. (2022). Annual Report GIA 2021. In https://www.rug.nl/research/groningen-institute-of-archaeology/about-the-institute/annualreport. Groningen Institute of Archaeology. https://www.rug.nl/research/groningen-institute-of-archaeology/about-the-institute/gia-annual-report-2021-fact-sheet.pdf

Shadow of the Tomb Raider Definitive Edition. (n.d.-a). Microsoft Xbox. Retrieved February 9, 2024, from https://www.xbox.com/en-us/games/store/shadow-of-the-tomb-raider-definitive-edition/bnqq3wvbnzcq

Shadow of the Tomb Raider: Definitive Edition. (n.d.). Steam. Retrieved February 9, 2024, from https://store.steampowered.com/app/750920/Shadow_of_the_Tomb_Raider_Definitive_Edition/

Shadow of the Tomb Raider Definitive Edition. (n.d.-b). PlayStation Store. Retrieved February 9, 2024, from https://store.playstation.com/en-gb/product/EP0082-CUSA10872_00-DEFINITIVE00SIEE

The Game Dev Show. "How to Add Multiple Sound Effects in Unity (3 MINUTES) - Unity 2022 Tutorial." YouTube, 7 Feb. 2022, www.youtube.com/watch?v=mvaUho_a-q4&ab_channel=TheGameDevShow

Toledo, Victor Manuel Campos. "How to Play Sound Effects in Unity: A Step-By-Step Guide." Medium, 13 June 2023, medium.com/@victormct/how-to-play-sound-effects-in-unity-a-step-by-step-guide-73e5e1d8e100

Tomb Raider. (n.d.). Video Game Sales Wiki. Retrieved February 9, 2024, from https://vgsales.fandom.com/wiki/Tomb_Raider

TramSim: Console Edition. (n.d.). Microsoft Xbox. Retrieved February 13, 2024, from https://www.xbox.com/en-US/games/store/tramsim-console-edition/9NXV814FQHLQ

TramSim: Console Edition PS4® & PS5®. (n.d.). PlayStation Store. Retrieved February 13, 2024, from https://store.playstation.com/en-us/product/UP3004-PPSA13987_00-TRAMSIM1BASEGAME

TramSim Vienna - The Tram Simulator. (n.d.). Steam. Retrieved February 11, 2024, from https://store.steampowered.com/app/1314140/TramSim_Vienna__The_Tram_Simulator/

TramSim Vienna - The Tram Simulator - Steam Stats. (n.d.). Gamalytic. Retrieved February 13, 2024, from https://gamalytic.com/game/1314140

Ubisoft. (n.d.). *Availability on Nintendo Switch*. Retrieved February 9, 2024, from https://www.ubisoft.com/en-gb/help/assassins-creed-odyssey/gameplay/article/availability-on-nintendo-switch/000061202

UNCHARTED: Legacy of Thieves Collection. (n.d.). PlayStation Store. Retrieved February 9, 2024, from https://store.playstation.com/en-gb/product/EP9000-PPSA05684_00-UNCHARTED4R00000

UNCHARTED™: Legacy of Thieves Collection. (n.d.). Steam. Retrieved February 9, 2024, from https://store.steampowered.com/app/1659420/UNCHARTED_Legacy_of_Thieves_Collection/

University of Groningen. (n.d.). *Archaeology: Bachelor - full-time*. https://www.rug.nl/bachelors/archaeology/?gad_source=1#!programme

Valve. "Steam Audio." *Valvesoftware.github.io*, valvesoftware.github.io/steam-audio/index.html

Van Turnhout, K. (2015a, December 21). *Comparison Chart*. CMD Methods Pack. https://cmdmethods.nl/cards/stepping-stones/comparison-chart

Van Turnhout, K. (2015b, December 21). *Ideation*. CMD Methods Pack. https://cmdmethods.nl/cards/workshop/ideation

Van Turnhout, K. (2015c, December 21). *Peer Review*. CMD Methods Pack. https://cmdmethods.nl/cards/showroom/peer-review

Van Turnhout, K. (2015d, December 21). *Sketching*. CMD Methods Pack. https://cmdmethods.nl/cards/workshop/sketching

Vlasenko, Kateryna V., et al. “UI/UX Design of Educational On-Line Courses.” *CTE Workshop Proceedings*, vol. 9, no. 9, 21 Mar. 2022, pp. 184–199, https://doi.org/10.55056/cte.114

Evidential documents:

- ➔ Raw data is not part of assessment; only used as evidence; don’t put important stuff in the raw data; include somewhere in an evidence
- ➔ Consent forms in a separate file
- ➔ Use markers so you can reference stuff in the main text

10. Evidential Documents

10.1. Research Plan

10.2. Research Paper

10.2. Design requirements

10.2.1. Functional Requirements

Functional requirements with priorities based on the MoSCoW method:

Number	Functional requirement	Source	Priority
FR1	As a user, I expect the simulation to incorporate dynamic elements, such as changing weather conditions and environmental variables, to provide a more dynamic and realistic excavation experience.	Expert Interview	Won't
FR2	As a user, I expect the simulation to offer feedback mechanisms and guidance that facilitate learning progression and skill development, including indication of correct and incorrect answers and explanations.	Desk Research	Must
FR3	As a user, I expect the game to strike a balance between providing sufficient content to maintain interest and avoiding overwhelming me with unnecessary information, ensuring an optimal learning experience.	Desk research	Must
FR4	As a user, I expect the game to provide clear and concise instructions, enabling me to understand what is expected of me and how to navigate the gameplay effectively.	Desk Research	Must
FR5	As a user, I expect the game to provide an appropriate level of challenge to avoid boredom, ensuring greater engagement and motivation to participate.	Desk Research	Should
FR6	As a user, I expect the simulation to strive for accessibility and usability for students with varying experiences with games.	Survey	Should
FR7	As a user, I want the game to prepare me for more advanced studies and fieldwork experiences in archaeology by building a strong foundation of knowledge and skills.	Survey	Should
FR8	As a user, I prefer a game that is accessible on Windows devices, ensuring easy access and compatibility without the need for any additional hardware.	Survey	Should
FR9	As a user, I prefer a balance between realism and enjoyability in the game's art style and mechanics, allowing for an immersive and educational experience while still being engaging and fun to play.	Survey	Should
FR10	As a user, I want the game to use familiar interactions and game mechanics from popular video games to make it accessible, engaging, easy to play, and adapt to.	Desk Research	Must
FR11	As a user, I want the game to have a user-friendly interface designed according to standards, ensuring effective and satisfying usage.	Desk Research	Must

FR12	As a user, I want the game to prevent errors and help me recognize and recover from them during gameplay.	Desk Research	Should
FR13	As a user, I expect the game to include opportunities for kinetic, strategic, and cognitive skill learning, not just educational content, to ensure a comprehensive and engaging learning experience.	Desk Research	Should
FR14	As a user, I want the game to help me develop spatial ability, visual attention, memory, executive control, and other cognitive skills.	Desk Research	Could

Table 7: Functional Requirements

10.2.2. Qualitative Requirements

Qualitative Requirements with priorities based on the MoSCoW method:

Number	Qualitative requirement	Source	Priority
QR1	As a user, I expect the archaeological simulation to create authentic and immersive environments that accurately represent excavation sites, artifacts, and archaeological processes.	Expert Interview, Competitive Analysis	Must
QR2	As a user, I expect the simulation to implement engaging gameplay mechanics, realistic interactions, and immersive storytelling techniques.	Trend & Competitive Analysis	Must
QR3	As a user, I expect the simulation to tailor to my learning needs and preferences providing an optimal balance between difficulty and achievability to promote continuous learning and progression.	Desk Research, Expert Evaluation	Should
QR4	As a user, I expect the simulation to provide opportunities for active engagement and critical thinking, allowing me to apply theoretical knowledge to practical excavation tasks.	Expert Interview, Trend Analysis, Desk Research	Should
QR5	As a user, I expect the game to be engaging and enjoyable to play, keeping me motivated and interested in learning about archaeology.	Survey	Could
QR6	As a user, I expect the game to encourage critical thinking and problem-solving skills relevant to archaeological fieldwork, preparing me for more advanced studies and practical experiences.	Survey	Should
QR7	As a user, I want the game to integrate with lectures and readings, providing supplementary material and activities that reinforce and expand upon what I am learning.	Survey	Must
QR8	As a user, I expect the simulation to effectively enhance my understanding of archaeological concepts and practices through hands-on experiences, active learning, repetition, and reinforcement of key concepts.	Survey	Must
QR9	As a user, I want the game to have a compelling narrative and main hero to keep me interested and motivated to play.	Desk Research	Won't
QR10	As a user, I want the game to provide trial and error gameplay and give immediate feedback so I can learn from my mistakes and keep playing.	Desk Research	Must
QR11	As a user, I want the game to have engaging gameplay and funny dialogs to keep me entertained.	Desk Research	Could

QR12	As a user, I want the game to feel like an engaging experience, not just traditional exercises, so I can learn while having fun.	Desk Research	Should
QR13	As a user, I want the game to start with a small story, assign me a mission, and maintain my interest throughout.	Desk Research	Could
QR14	As a user, I want the game to have a simple and elegant user interface that is easy to understand, focusing on minimalism to improve effectiveness and satisfaction.	Desk Research	Must

Table 8: Qualitative Requirements

10.2.3. Design Specifications

Design specifications, along with the design requirements that they originate from.

Number	Design Specification	Source
DS1	The simulation will create authentic and immersive environments that accurately represent excavation sites, artifacts, and archaeological processes.	QR1, QR2
DS2	The simulation will implement engaging gameplay mechanics, realistic interactions, and immersive storytelling techniques.	QR2, QR10, FR11
DS3	The simulation will tailor the learning experience to users' needs and preferences, providing an optimal balance between difficulty and achievability to promote continuous learning and progression.	QR3, FR5
DS4	The simulation will provide opportunities for active engagement and critical thinking, allowing users to apply theoretical knowledge to practical excavation tasks.	QR4, FR13
DS5	The simulation will ensure the game is engaging and enjoyable to play, keeping users motivated and interested in learning about archaeology.	QR5, QR11
DS6	The simulation will encourage critical thinking and problem-solving skills relevant to archaeological fieldwork, preparing users for more advanced studies and practical experiences.	QR6, QR12
DS7	The simulation will integrate with lectures and readings, providing supplementary material and activities that reinforce and expand upon what users are learning.	QR7
DS8	The simulation will effectively enhance users' understanding of archaeological concepts and practices through hands-on experiences, active learning, repetition, and reinforcement of key concepts.	QR8, QR9
DS9	The simulation will provide trial and error gameplay and give immediate feedback so users can learn from their mistakes and keep playing.	QR10, FR2, FR12
DS10	The simulation will design a simple and elegant user interface that is easy to understand, focusing on minimalism to improve effectiveness and satisfaction.	QR14, FR11
DS11	The simulation will incorporate dynamic elements such as changing weather conditions and environmental variables to provide a more dynamic and realistic excavation experience.	FR1
DS12	The simulation will strike a balance between providing sufficient content to maintain interest and avoiding overwhelming users with unnecessary information, ensuring an optimal learning experience.	FR3

DS13	The simulation will strive for accessibility and usability for students with varying experiences with games.	FR6
DS14	The simulation will prepare users for more advanced studies and fieldwork experiences in archaeology by building a strong foundation of knowledge and skills.	FR7
DS15	The simulation will be accessible on Windows devices, ensuring easy access and compatibility without the need for any additional hardware.	FR8
DS16	The simulation will ensure a balance between realism and enjoyability in the game's art style and mechanics, allowing for an immersive and educational experience while still being engaging and fun to play.	FR9
DS17	The simulation will prevent errors and help users recognize and recover from them during gameplay.	FR12
DS18	The simulation will include opportunities for kinetic, strategic, and cognitive skill learning, not just educational content, to ensure a comprehensive and engaging learning experience.	FR13, FR14

Table 9: Design Specifications

10.2.4. MoSCoW method

- Explanation:
  The MoSCoW method is a prioritization technique used to categorize features into four different categories: “Must have”, “Should have”, “Could have”, and “Would like but won't get” (MoSCoW, n.d.). This was done based on the conducted desk research, target audience research, client meetings, and time constraints. A justification for each design requirement can be found here.
- Justification:
  This method helped me prioritize the most important features, which was important due to the limited timeframe of this project. By focusing on the “Must have” features, I was able to create a concept that fulfils the users needs and develop a successful prototype based on it.
- Execution:
  To maintain a clean overview of all requirements, I have added them into an Excel file and added checkboxes next to them. This also allowed me to easily adjust them based on client feedback or new research findings.
- Results:

Functional Requirements				
Nr.	**Must**	**Should**	**Could**	**Won't**
FR1	☐	☐	☐	☑
FR2	☑	☐	☐	☐
FR3	☑	☐	☐	☐
FR4	☑	☐	☐	☐
FR5	☐	☑	☐	☐
FR6	☐	☑	☐	☐
FR7	☐	☑	☐	☐
FR8	☐	☑	☐	☐
FR9	☐	☑	☐	☐
FR10	☑	☐	☐	☐
FR11	☑	☐	☐	☐
FR12	☐	☑	☐	☐
FR13	☐	☑	☐	☐
FR14	☐	☐	☑	☐

Table 10: Functional Requirements Priorities - Excel

Qualitative Requirements				
Nr.	**Must**	**Should**	**Could**	**Won't**
FR1	☑	☐	☐	☐
FR2	☑	☐	☐	☐
FR3	☐	☑	☐	☐
FR4	☐	☑	☐	☐
FR5	☐	☐	☑	☐
FR6	☐	☑	☐	☐
FR7	☑	☐	☐	☐
FR8	☑	☐	☐	☐
FR9	☐	☐	☐	☑
FR10	☑	☐	☐	☐
FR11	☐	☐	☑	☐
FR12	☐	☑	☐	☐
FR13	☐	☐	☑	☐
FR14	☑	☐	☐	☐

Table 11: Qualitative Requirements Priorities - Excel

MoSCoW priority justifications:

Functional Requirements:

1. **FR1 - Dynamic Simulation:**
    - *Priority:* Won't
    - *Explanation:* Although dynamic elements would enhance the realism of the simulation, considering the project's time and resource constraints, implementing these features is not feasible. It is also outside of the scope of the clients goal and does not improve the educational value significantly enough to justify its implementation.
2. **FR2 - Feedback Mechanisms:**
    - *Priority:* Must
    - *Explanation:* Feedback mechanisms are crucial for facilitating learning progression and skill development, aligning with the primary objective of the educational game.
3. **FR3 - Balanced Content:**
    - *Priority:* Must
    - *Explanation:* Striking a balance between providing sufficient content and avoiding overwhelming users is essential for ensuring an optimal learning experience, as well as enjoyment of playing the game.
4. **FR4 - Clear Instructions:**
    - *Priority:* Must
    - *Explanation:* Clear and concise instructions are fundamental for enabling users to understand gameplay effectively, enhancing the overall user experience.
5. **FR5 - Appropriate Challenge:**
    - *Priority:* Should
    - *Explanation:* Providing an appropriate level of challenge is important for maintaining user engagement and motivation throughout the game.
6. **FR6 - Accessibility and Usability:**
    - *Priority:* Should
    - *Explanation:* Striving for accessibility and usability is crucial for accommodating users with varying levels of gaming experience, ensuring inclusivity.
7. **FR7 - Advanced Preparation:**
    - *Priority:* Should
    - *Explanation:* Preparing users for more advanced studies and fieldwork experiences in archaeology aligns with the educational objectives of the game.

8. **FR8 - Windows Compatibility:**
    - *Priority:* Should
    - *Explanation:* Ensuring compatibility with Windows devices enhances accessibility, making the game more widely available to users.
9. **FR9 - Balance Between Realism and Enjoyability:**
    - *Priority:* Should
    - *Explanation:* Balancing realism with enjoyability is essential for creating an immersive and engaging educational experience that keeps students interested in the game.
10. **FR10 - Familiar Interactions and Game Mechanics:**
    - *Priority:* Must
    - *Explanation:* Using familiar interactions and game mechanics is crucial for making the game accessible, engaging, and easy to adapt to, enhancing the overall user experience.
11. **FR11 - User-Friendly Interface:**
    - *Priority:* Must
    - *Explanation:* A user-friendly interface designed according to standards is essential for ensuring effective and satisfying usage of the game.
12. **FR12 - Error Prevention and Recovery:**
    - *Priority:* Should
    - *Explanation:* Preventing errors and helping users recognize and recover from them during gameplay is important for providing a seamless user experience.
13. **FR13 - Skill Learning Opportunities:**
    - *Priority:* Should
    - *Explanation:* Including opportunities for skill learning is essential for ensuring a comprehensive and engaging learning experience.
14. **FR14 - Cognitive Skill Development:**
    - *Priority:* Could
    - *Explanation:* Helping users develop cognitive skills enhances the educational value of the game, although it is not as critical as other functional requirements.

Qualitative Requirements:

1. **QR1 - Authentic and Immersive Environments:**
    - *Priority:* Must
    - *Explanation:* Creating authentic and immersive environments is essential for providing users with a realistic and engaging learning experience.

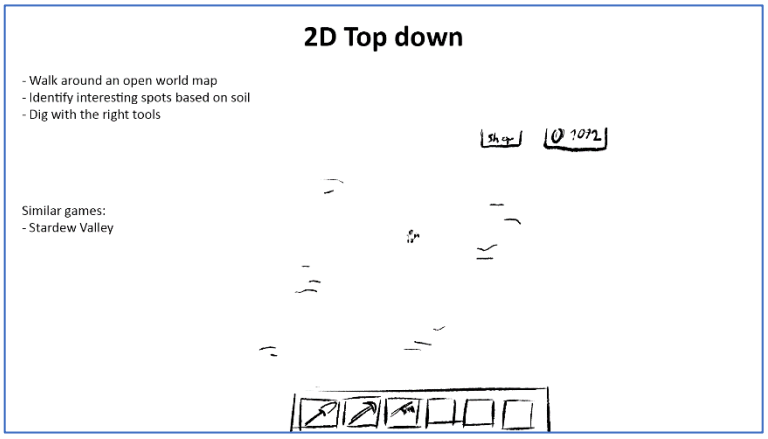
2. **QR2 - Engaging Gameplay Mechanics:**
    - *Priority:* Must
    - *Explanation:* Implementing engaging gameplay mechanics is crucial for keeping users motivated and interested in learning about archaeology. It also helps to convey archaeological concepts and shows how to perform certain tasks in real life.
3. **QR3 - Tailored Learning Experience:**
    - *Priority:* Should
    - *Explanation:* Tailoring the learning experience to users' needs and preferences promotes continuous learning and progression while also preventing frustration of not being able to complete tasks and giving up entirely.
4. **QR4 - Opportunities for Engagement and Critical Thinking:**
    - *Priority:* Should
    - *Explanation:* Providing opportunities for engagement and critical thinking enables users to apply theoretical knowledge to practical tasks, enhancing the learning experience.
5. **QR5 - Engaging and Enjoyable Gameplay:**
    - *Priority:* Could
    - *Explanation:* Ensuring that the game is engaging and enjoyable maintains user motivation and interest in learning.
6. **QR6 - Encouraging Critical Thinking and Problem-Solving:**
    - *Priority:* Should
    - *Explanation:* Encouraging critical thinking and problem-solving skills prepares users for more advanced studies and practical experiences in archaeology.
7. **QR7 - Integration with Lectures and Readings:**
    - *Priority:* Must
    - *Explanation:* Integrating with lectures and readings reinforces and expands upon what users are learning, enhancing the educational value of the game.
8. **QR8 - Effective Understanding Enhancement:**
    - *Priority:* Must
    - *Explanation:* Effectively enhancing users' understanding of archaeological concepts and practices is fundamental for achieving the educational objectives of the game.
9. **QR9 - Compelling Narrative and Main Hero:**
    - *Priority:* Won't
    - *Explanation:* While a compelling narrative is desirable, it is not feasible within the current project constraints.

10. **QR10 - Trial and Error Gameplay with Immediate Feedback:**
    - *Priority:* Must
    - *Explanation:* Providing trial and error gameplay with immediate feedback is essential for facilitating learning and user progression.
11. **QR11 - Engaging Gameplay and Funny Dialogs:**
    - *Priority:* Could
    - *Explanation:* Including engaging gameplay and funny dialogs enhances user entertainment and engagement, especially considering the among of times that students and the client expressed wishes for Indiana Jones references.
12. **QR12 - Engaging Experience Beyond Traditional Exercises:**
    - *Priority:* Should
    - *Explanation:* Providing an engaging experience beyond traditional exercises ensures that users learn while having fun.
13. **QR13 - Small Story, Mission Assignment, and Continuous Interest:**
    - *Priority:* Could
    - *Explanation:* Starting with a small story, assigning a mission, and maintaining user interest throughout the game enhances engagement and motivation.
14. **QR14 - Simple and Elegant User Interface:**
    - *Priority:* Must
    - *Explanation:* A simple and elegant user interface improves effectiveness and satisfaction, ensuring a positive user experience.

11. Concept Ideas

1) **2D top down game** (Like Stardrew Valley)

In this game, players can freely walk around an open world map. They have to analyse the soil and identify archaeologically interesting spots based on it. Once they found one, they have to dig with the right tools. Selling the discovered artifacts gives them money to buy more advanced tools, like excavators, which allows for a more in-depth excavation. They can also buy vehicles, and later on planes or other transportation means, to reach other areas of the map that hold rare artifacts.

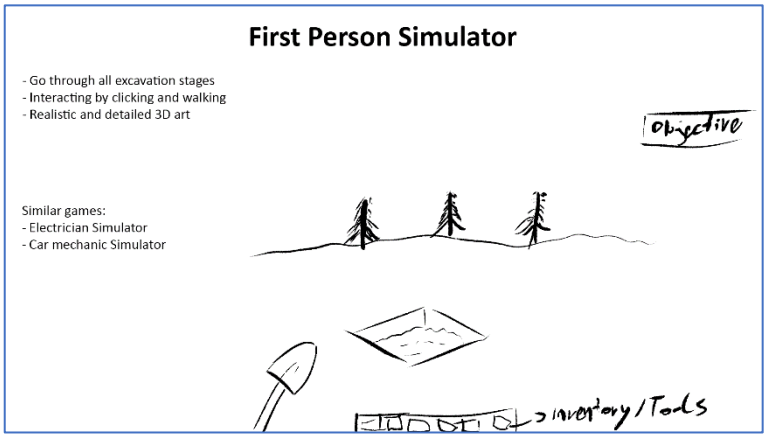


Design Requirement: FR1, FR2, FR3, FR4, FR5, FR6, FR8, QR4, QR5, QR6

2) **First person Simulator** (Like Electrician Simulator)

Players go through all stages of an excavation level by level in a 3D first person. At first, the game tells them what to you, but later on they have to figure it out themselves. They have to overcome challenges that become more and more difficult.

An alternative to this would be for the players to complete all stages of an excavation in one level, with each one bringing unique challenges.



Design Requirement: FR1, FR2, FR3, FR4, FR5, FR6, FR8, FR9, QR1, QR2, QR4, QR5, QR6, QR8

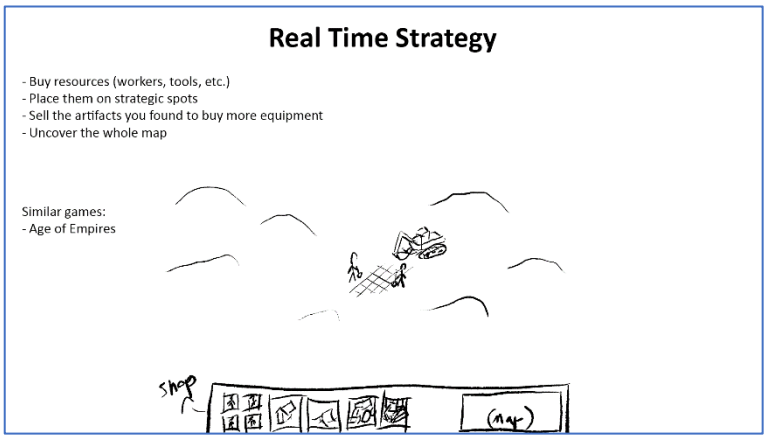
3) Quiz adventure

Players have to answer questions that could come up in an exam. This could be done within a phone app, allowing them to study on the go. Completing questions rewards them with experience points, which are displayed on their profile. This way, they can compare their progress with friends and colleagues.

Design Requirement: FR2, FR4, FR5, FR7, FR8, QR6, QR7

4) Real time strategy game (Like Age of Empires)

Players have to manage resources, like excavators, photographers, etc., and place them onto different spots on the map to perform excavations. They can sell discovered artifacts to hire new workers and buy new tools, which helps them work faster and generate more money.

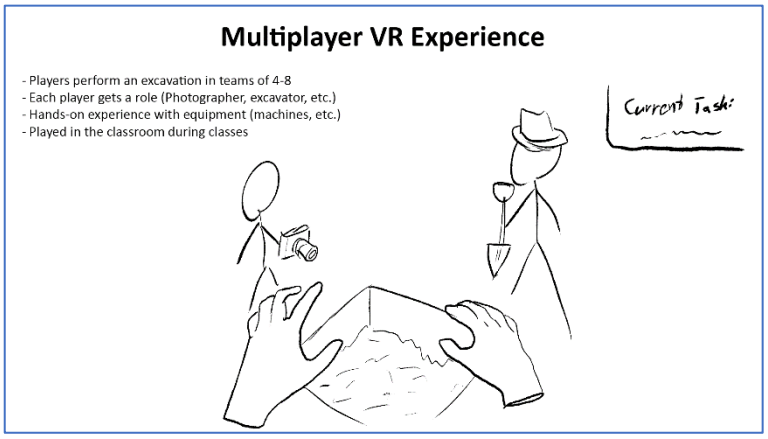


Design Requirement: FR1, FR3, FR4, FR5, FR8, QR5

5) VR Experience

a) Multiplayer

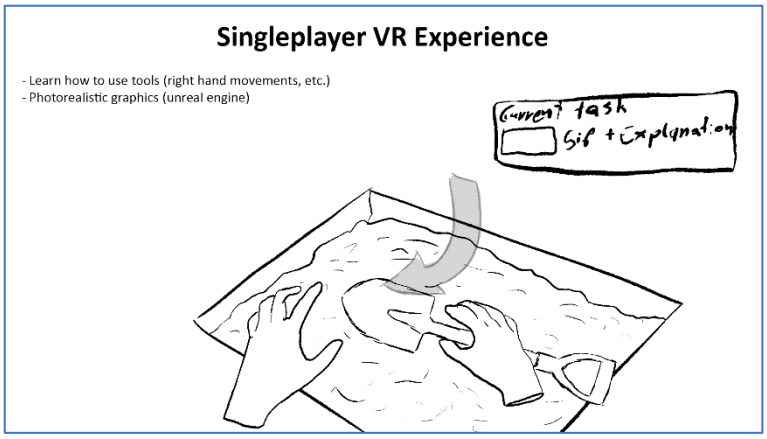
Players perform an excavation in teams of 4 and are divided into different roles (excavator, photographer, etc.). They have to work together to solve challenges and complete the excavation. The game would be played in the classroom during classes.



Design Requirements: FR1, FR2, FR3, FR4, FR5, FR7, QR1, QR4, QR5, QR6, QR8

b) Singleplayer

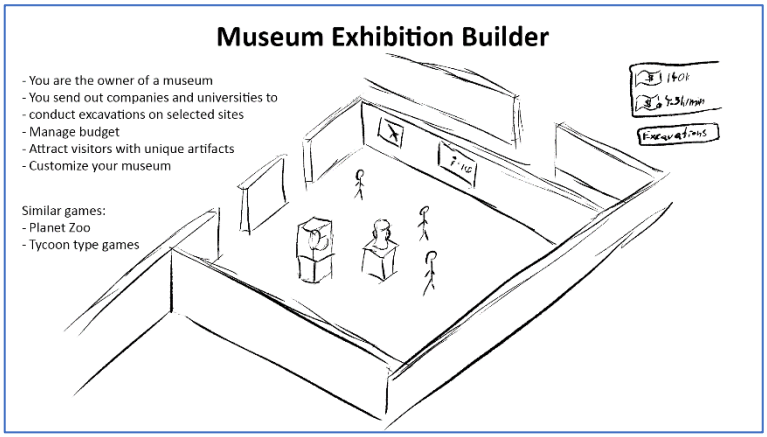
More detailed instructions on fieldwork, where players learn how to use tools correctly, such as using the right hand-movements. The game would run in Unreal Engine and feature photorealistic graphics.



Design Requirements: FR1, FR2, FR3, FR4, FR5, FR7, QR1, QR4, QR5, QR6, QR8

6) **Museum exhibition builder** (Tycoon type game)

Players are the owners of a museum and have to send out companies and universities to archaeological sites. They have to manage their budget and generate more money by attracting visitors with unique artifacts.



Design Requirements: FR4, FR5, FR6, FR8, QR2, QR5

12. Concept comparison aspects

Educational Value:

- Description: Indicates how effectively the game imparts archaeological knowledge and skills, preparing players for advanced studies and practical experiences.
- Importance: Essential for the game to fulfil its educational purpose and ensure players gain a solid understanding of archaeological concepts and practices.
- Requirements Covered: FR2, FR4, FR7, QR3, QR4, QR6, QR7, QR8

Immersion:

- Description: Reflects the game's ability to engage players deeply in the archaeological excavation experience, balancing realism and enjoyability.
- Importance: Enhances player motivation, interest, and retention of knowledge by creating an immersive and captivating learning environment.
- Requirements Covered: FR1, FR9, QR1, QR2, QR4, QR5

Accessibility:

- Description: Indicates how easily players with varying levels of gaming and archaeological knowledge can access and navigate the game.
- Importance: Ensures inclusivity and accommodates players with different learning needs and preferences, promoting broader engagement and participation.
- Requirements Covered: FR4, FR6, FR8

Gameplay Mechanics:

- Description: Refers to the interactive elements, challenges, and activities within the game that contribute to player engagement and learning progression.
- Importance: Drives player interaction, skill development, and progression through the game, fostering a dynamic and enjoyable learning experience.
- Requirements Covered: FR4, FR5, QR1, QR2, QR5, QR6

Engagement:

- Description: Represents the level of player involvement, critical thinking, and problem-solving opportunities provided by the game.
- Importance: Encourages active engagement, exploration, and application of theoretical knowledge to practical excavation tasks, enhancing learning effectiveness.
- Requirements Covered: FR4, FR5, QR2, QR4, QR5, QR6

Realism/Authenticity:

- Description: Reflects how accurately the game depicts archaeological processes, artifacts, and excavation sites, contributing to a realistic learning experience.
- Importance: Ensures credibility and trustworthiness of the game content, promoting deeper understanding and appreciation of archaeology.
- Requirements Covered: FR1, FR9, QR1, QR4, QR8

Scalability:

- Description: Indicates whether the game allows for expansion with new levels, content, and features, accommodating continued learning and exploration.
- Importance: Supports long-term engagement and adaptability to evolving educational needs, providing ongoing opportunities for learning and discovery.
- Requirements Covered: FR5

Replayability:

- Description: Refers to the extent to which players are inclined to replay the game for repetition and reinforcement of learning, offering varied experiences and challenges.
- Importance: Promotes retention of knowledge and skill mastery through repeated gameplay, reinforcing key concepts and facilitating deeper understanding.
- Requirements Covered: FR1, FR5, QR3, QR8

Feedback Mechanisms:

- Description: Indicates how the game provides feedback to players by informing them of both correct and incorrect actions, guiding learning progression and skill development in archaeological methodologies and techniques.
- Importance: Offers guidance on player performance, identifies areas for improvement, and reinforces correct behaviours, enhancing learning effectiveness and skill acquisition.
- Requirements Covered: FR2, FR4, FR5

13.Wizard of Oz concept testing – Raw Data

Test 1:

First person simulator:

Pros:

- 3d is really nice and could be really immersive
- good for beginners to get into routine
- if it shows and goes through all steps it will help with active recall and learning the patterns/routine

Cons:

- Could get repetitive

VR multiplayer:

Pros:

- very immersive and interactive
- good classroom activity

Cons:

- not many students have a VR headset
- can't study it at home because I don't have my team with me and no VR
- not very accessible to many
- probably hard to set up, I don't have too much VR knowledge

Real time:

Pros:

- seems fun, very game like similar to hay day I am assuming?

Cons:

- does it actually teach about excavation processes?
- it's not giving the educational experience I would need. It is just a game for buying and selling, seems fu but I won't really learn much

VR Single player:

Pros:

- gives as close to real life experience as possible
- very detailed

Cons:

- limited access
- not everyone has VR at home
- harder set up with controller etc
- very time consuming

Top Down:

Pros:

- like the open world, gives sense of freedom and exploration – curious
- educational because i can learn from it (which tools and where to dig etc)

Cons:

- can be a bit boring just being 2d
- not as immersive, I can learn from it but my vision and interactivity is quite limited

Test 2:

First person simulator:

Pros:

- would have a lot of educational value
- I like the "serious"/focused aspect of it
- the photorealism and first person would definitely be a very immersive and simulate how it is done in real life

Cons:

- might lack some gamified elements/motivation to keep going back to the game

VR Multiplayer:

Pros:

- like that its collective so everyone can learn from everyone
- like the roles and the fact that you can experience a new one every time. very nice to be able to experience all of them and the uniqueness that they all offer

Cons:

- not a con per se, but can be quite difficult to develop as it is a multiplayer experience
- not suitable if you want to do individual learning

Real time strategy

Pros:

- actually, love the concept, it reminds me of a lot of games I played as a kid. That might be a very good selling point, or something that attracts people

Cons:

- can be easy to fall a lot into the game, and forget about the educational information from it

2d top-down:

pros

- again, the similarity to Stardew Valley is very attractive, and can attract a lot of audiences. can take a lot of inspiration ideas from it
- this one seems a lot less gamified that the one before, so it can still be easily fun and educational at the same time

cons

- might lack some external motivation to keep playing the game

overall really like all concepts, think the first one is my favourite, and the one that can be more useful for archaeology students to actually get some hands-on experience on their learning

14.Wizard of Oz testing – Summary

Peer evaluation

First Person Simulator:

- Pros: High educational value, immersion, realism, accessibility, potential for gamification, seriousness/focused aspect.
- Cons: Potential repetitiveness.

VR Multiplayer:

- Pros: Collective learning experience, diverse roles, potential for unique experiences.
- Cons: Development complexity, limited to multiplayer, not suitable for individual learning.

Real-Time Strategy:

- Pros: Familiar gaming concept, potential to attract players.
- Cons: Risk of overshadowing educational content, potential distraction from learning objectives.

2D Top-Down:

- Pros: Similarity to popular games like Stardew Valley, potential for fun and education.
- Cons: Potential lack of external motivation, less gamified compared to other concepts.

With this ranking, the First Person Simulator remains the most successful concept, followed by the VR Multiplayer, Real-Time Strategy, and 2D Top-Down concepts respectively.

15. Concept comparison – Detailed Data

1. 2D Top down game (FR1, FR2, FR3, FR4, FR5, FR6, FR8, QR4, QR5, QR6)

Educational Value: FR2, FR4, FR7, QR3, QR4, QR6, QR7, QR8	4/8
Immersion: FR1, FR9, QR1, QR2, QR4, QR5	3/6
Accessibility: FR4, FR6, FR8	3/3
Gameplay Mechanics: FR4, FR5, QR1, QR2, QR5, QR6	4/6
Feedback Mechanisms: FR2, FR4, FR5	3/3
Engagement: FR4, FR5, QR2, QR4, QR5, QR6	5/6
Realism/Authenticity: FR1, FR9, QR1, QR4, QR8	2/5
Scalability: FR5	1/1
Replayability: FR1, FR5, QR3, QR8	2/4

2. First person Simulator (FR1, FR2, FR3, FR4, FR5, FR6, FR8, FR9, QR1, QR2, QR4, QR5, QR6, QR8)

Educational Value: FR2, FR4, FR7, QR3, QR4, QR6, QR7, QR8	5/8
Immersion: FR1, FR9, QR1, QR2, QR4, QR5	6/6
Accessibility: FR4, FR6, FR8	3/3
Gameplay Mechanics: FR4, FR5, QR1, QR2, QR5, QR6	6/6
Feedback Mechanisms: FR2, FR4, FR5	3/3
Engagement: FR4, FR5, QR2, QR4, QR5, QR6	6/6
Realism/Authenticity: FR1, FR9, QR1, QR4, QR8	5/5
Scalability: FR5	1/1
Replayability: FR1, FR5, QR3, QR8	3/4

3. Real time strategy game: FR1, FR3, FR4, FR5, FR8, QR5

Educational Value: FR2, FR4, FR7, QR3, QR4, QR6, QR7, QR8	1/8
Immersion: FR1, FR9, QR1, QR2, QR4, QR5	2/6
Accessibility: FR4, FR6, FR8	2/3
Gameplay Mechanics: FR4, FR5, QR1, QR2, QR5, QR6	3/6
Feedback Mechanisms: FR2, FR4, FR5	2/3
Engagement: FR4, FR5, QR2, QR4, QR5, QR6	3/6
Realism/Authenticity: FR1, FR9, QR1, QR4, QR8	1/5
Scalability: FR5	1/1
Replayability: FR1, FR5, QR3, QR8	2/4

4. VR Experience: FR1, FR2, FR3, FR4, FR5, FR7, QR1, QR4, QR5, QR6, QR8

Educational Value: FR2, FR4, FR7, QR3, QR4, QR6, QR7, QR8	6/8
Immersion: FR1, FR9, QR1, QR2, QR4, QR5	4/6
Accessibility: FR4, FR6, FR8	1/3
Gameplay Mechanics: FR4, FR5, QR1, QR2, QR5, QR6	5/6
Feedback Mechanisms: FR2, FR4, FR5	3/3
Engagement: FR4, FR5, QR2, QR4, QR5, QR6	5/6
Realism/Authenticity: FR1, FR9, QR1, QR4, QR8	4/5
Scalability: FR5	1/1
Replayability: FR1, FR5, QR3, QR8	3/4

16. Game Stages – First Version

Stages of the first level

1. Introduction & Preparations

1.1. Research and contextual understanding

a) **Site selection:** A new site gets unlocked on the map and players can select it. This opens a letter with an invitation to an excavation, along with a description of the budged and goal.
b) **Historical background:** The letter will include a description of the site and its historical background, along with an explanation of what makes the site interesting.

Interaction: Players click on a site and read through the description.

What students will learn: How historical context influences site selection, emphasizing the importance of historical clues.

Gameplay:

- World map that rolls open on the table
- Multiple sites to choose from with each of them bringing a different challenge. Players go through them level by level, but they have to unlock them.

1.2. Administrative procedures

a) **Archaeological permissions:** Obtaining necessary permissions and permits from relevant authorities or landowners to conduct the excavation.
b) **Informing the ministry:** Submitting and official notification detailing the intent to excavate. This involves providing information about the site, the proposed excavation methods, and the expected duration.

Interaction: Players need to fill out the landlord agreement by dragging information to the right place of the contract. The game will tell them if they made any mistakes or if they succeeded.

What students will learn: The significance of permits and documentation, understanding the regulatory process in archaeological excavations.

Gameplay:

Players access the computer and open the “Forms” program and have to fill out the necessary forms.

1.3. Planning and Logistics

a) **Plan of Action (PvA):** Creating a detailed plan outlining the scope of the excavation, including the objectives, proposed methodology, timelines, personnel involved, safety protocols, and strategies for documentation analysis.
b) **Resource arrangement:** Organizing necessary resources and equipment such as excavation tools, safety gear, documentation materials (forms, cameras, tables)

Interaction: Players can fill out a simplified version of the Plan of Action by dragging the stages in the right order. The game will give feedback on what is correct.

What students will learn: Developing a PvA, recognizing the importance of meticulous planning and resource management for a successful excavation.

1.4. Go to the site

a) **Outfit selection:** Put on the correct clothes and safety gear from your closet. (Players can unlock new clothes by collecting experience points in each level).
b) Click on the door to go to the site.

Interaction: Going to the closet and selecting the correct clothes from a list of pictures.

What students will learn: The importance of choosing the correct outfit.

2. On-site steps:

2.1. Safety measures

a) **Safety clothing:** Put on the correct clothes including a hat, shoes, etc.
b) **Site demarcation:** Mark the site perimeter with tape or flags for clear identification.
c) **Hazard assessment:** Walk around the site to identify potential risks.
d) **Precautions:** Place warning signs or flags at hazardous spots.

Interaction: Players select correct clothes from a list of pictures. They can then freely walk around the site to mark the perimeter, identify hazards and place flags or warning signs by clicking on designated spots.

What students will learn: Learning about the importance of proper gear and understanding risk assessment and safety protocols in excavation sites, fostering awareness of potential hazards and preventive measures.

2.2. Site preparation:

a) **Clearing the area:** Walking around the site and removing debris, vegetation, or any obstacles that hinder access to the excavation site.
b) **Surveillance:** Check for the presence of animals or individuals within the vicinity.

Interaction: Players walk around the site and click on objects that are in the way to remove them. They communicate with locals to vacate the area and relocate animals.

What students will learn: Recognizing site-clearing procedures, ensuring site security and addressing potential intruders professionally.

2.3. Geophysical Survey:

a) Create a grid with spray paint.
b) **Ground Radar Scanning:** Use radar scanning to assess the ground.
c) **Creating a sketch:** Create a sketch based on the scan results, highlighting interesting finds.
d) **Visualize the grid:** Place flags and lines/tape on the site to visualize the grid from their sketch.

Interaction: Players use the scanner to scan the ground and make a sketch based on the results by drawing with their mouse on a checkered paper.

What students will learn: Introduction to ground scanning, sketching based on scans, and understanding grid systems in site organisation.

2.4. Analysing maps:

a) **Map comparison:** Analyse various maps (Aerial photograph, topographic map, site plans, geophysical survey map, excavation grid map, geographic information system map).
b) **Grid selection:** Choose a grid location for the excavation based on the map analysis.

Interaction: Players can enable/disable maps that are stacked on top of each other and draw on a layer on top of them. They choose a grid to excavate based on what they see on the maps.

What students will learn: How to read and interpret map data, making informed decisions based on analysis, and selecting excavation areas.

2.5. Excavation techniques:

a) **Method selection:** Choose between different excavation methods based on findings and budget (single context, 1x1 meter, trench, or strip excavation). For the first level, only the 1x1 meter method will be selectable.
b) **Tool selection:** Select the appropriate tools for excavation (Brushes, shovels, towels).
c) **Stratigraphic excavation:** Dig in layers to reveal artifacts sequentially, until all pieces are uncovered.

Interaction: Players select excavation methods and tools, engaging in virtual excavation activities to understand excavation processes and the importance of stratigraphy.

What students will learn: Familiarity with excavation tools, understanding excavation methodologies, and appreciating the significance of stratigraphic excavation.

2.6. Recovering artifacts:

a) **Tool usage:** Use brushes, shovels or hand hoses to uncover the artifacts.
b) **Artifact handling:** Secure the artifact pieces and carry them to a safe area.

Interaction: Players use tools to uncover and handle artifacts and place them on a table after walking to a safe area.

What students will learn: Proper artifact recovery techniques, and artifact handling procedures.

2.7. Cataloguing and tagging:

a) **Labels:** Add labels to artifacts with important information (location, time of excavation, etc.).

Interaction: Players add labels to artifacts by typing out the time, location, and other important information.

What students will learn: Understanding the importance of cataloguing and tagging artifacts for documentation, research, and preservation purposes.

2.8. Recording and documentation:

a) **Visual documentation:** Capture photographs and create sketches of findings.
b) **Reconstruction:** Assemble the artifact to its original form.

Interaction: Take pictures and draw sketches of the artifact pieces, then assemble them by dragging and dropping the pieces like a puzzle.

What students will learn: Accurate recording, documentation, and reconstruction to preserve archaeological data effectively for analysis and interpretation.

10.8. Game stages – Final version

TODO add final version

10.9. Flowchart – First version

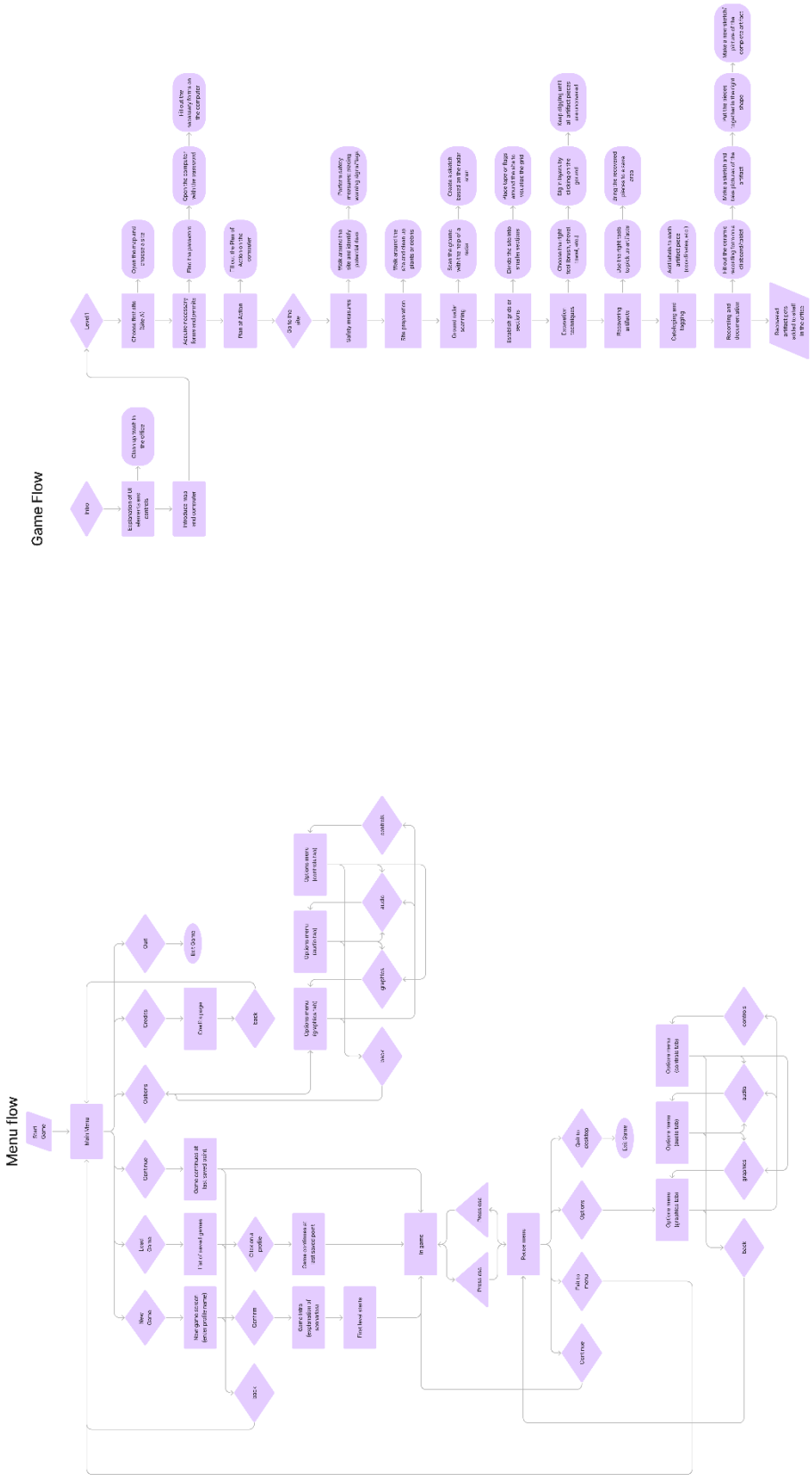


Figure 8: Flowchart - First Version

10.10. Flowchart – Final version

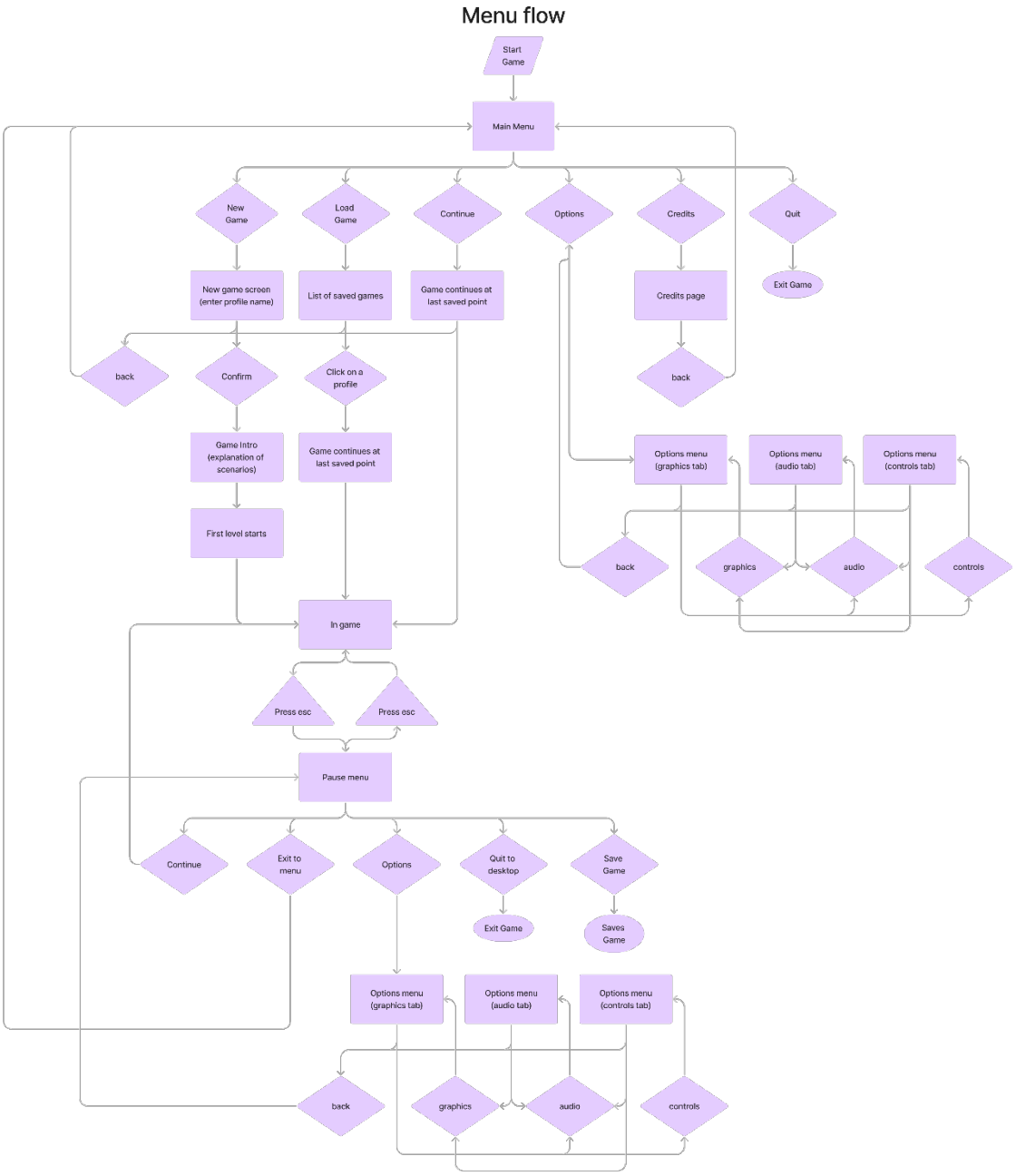


Figure 9: Flowchart - Final Version (Part 1)

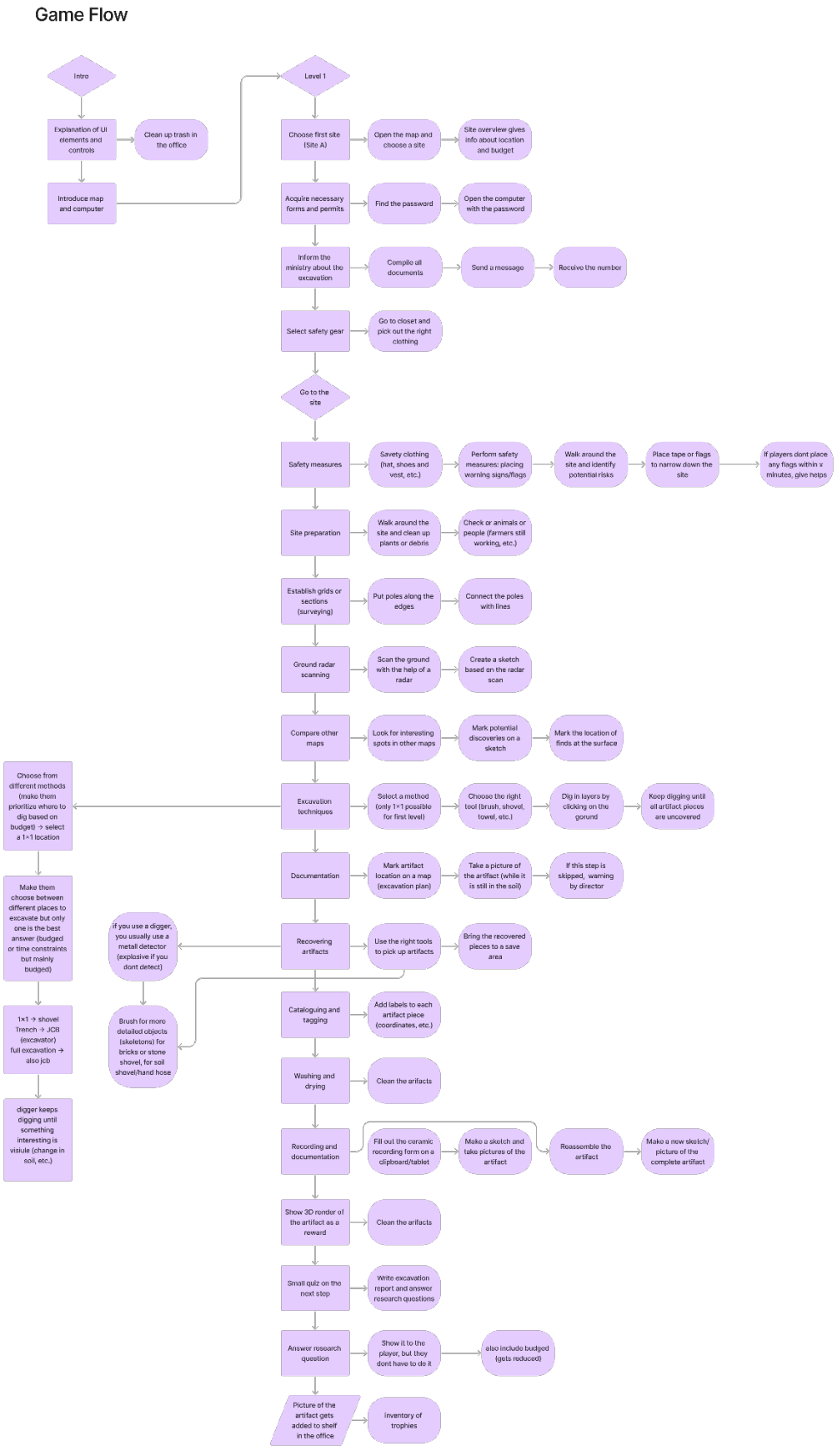


Figure 10: Flowchart - Final Version (Part 2)

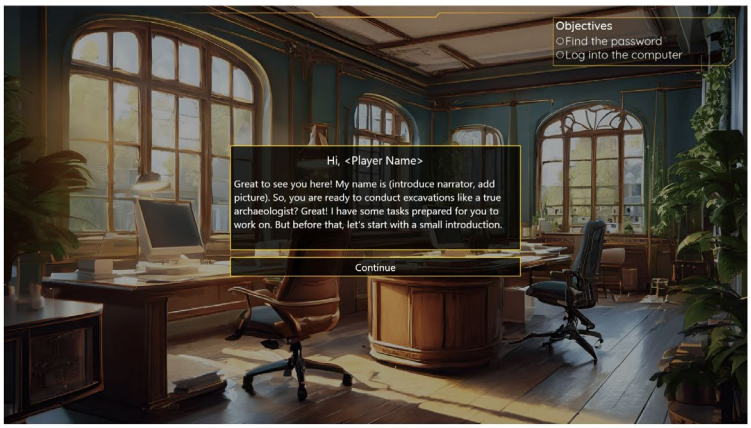
10.11. Concept art – V1

Archaeology Game Concept

Kevin Hofbauer

Tutorial I

- Explanation of UI elements



Tutorial II

- Introducing map and computer

Choosing the first site

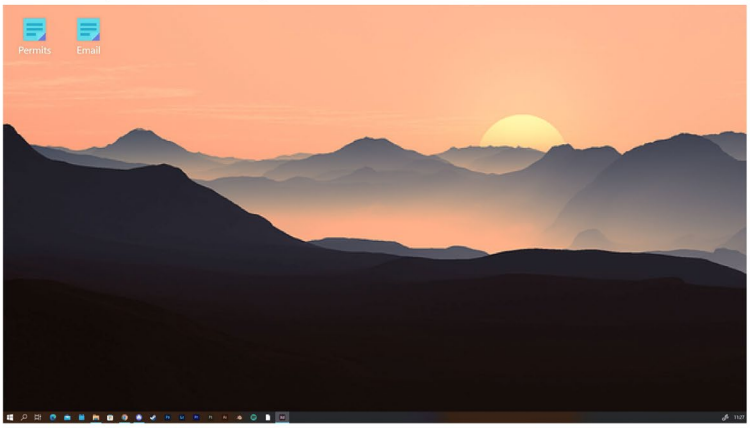
- Open the map and select Site A

Choosing the first site

- Open the map and select Site A

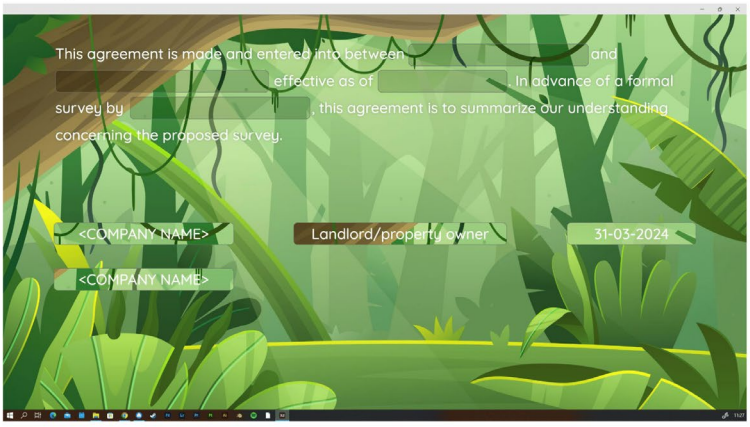
Aqcuire necessary forms and permits

- Find the password and open the computer



Aqcuire necessary forms and permits

- Fill out the landlord agreement form

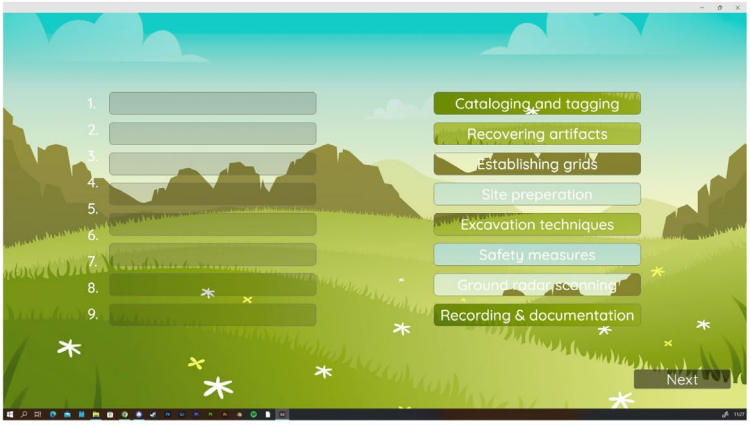


Inform the ministry

- Inform the ministry about the fieldwork
- Wait for their permission

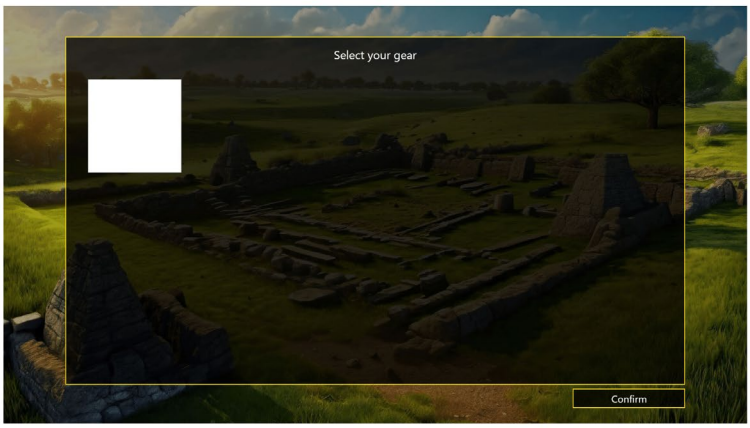
Plan of Action

- Fill out the Plan of Action on the computer



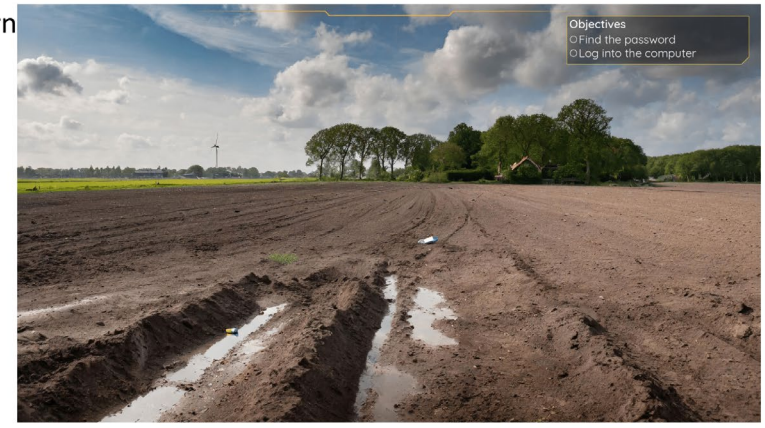
Go to the site

- Put on safety gear, walk to the door and travel to the site



Safety measures

- Walk around the site and identify potential risks
- Place flags/warn



Safety measures

- Place flags/warning signs to point out hazards

Site preperation

- Clean up plants or debris that are in the way

Establish grids or sections

- Divide the site into smaller sections with spray paint

Ground radar scanning

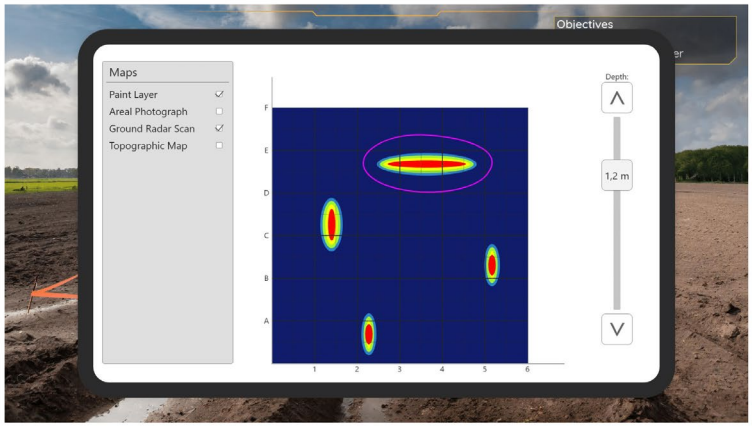
- Scan the ground with the help of a radar

Ground radar scanning

- Place tape to mark the grid

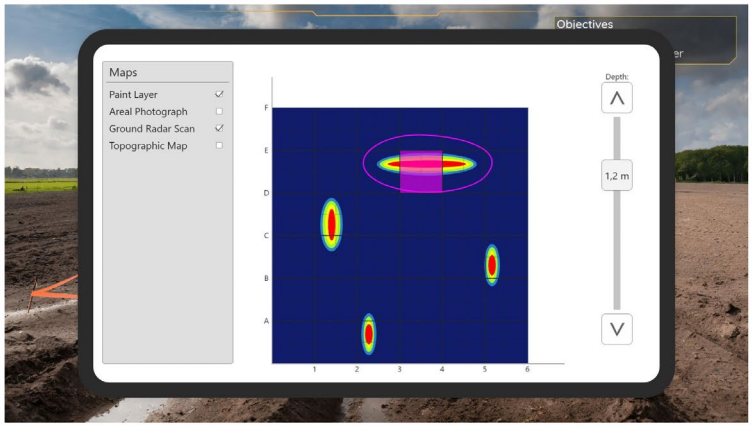
Analyse maps

- Compare the scan to other maps and highlight areas of interest



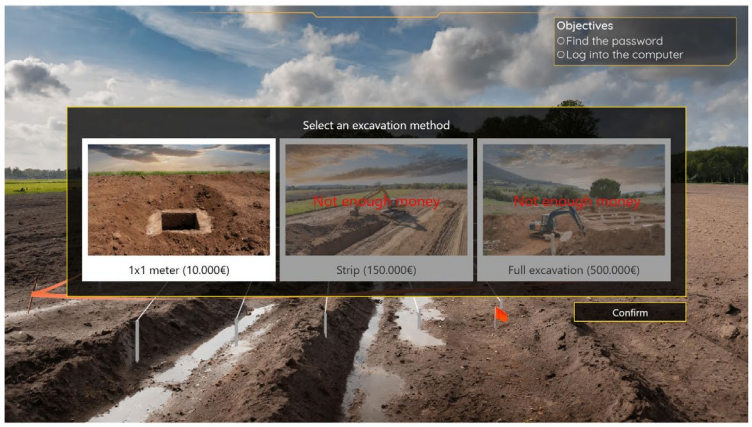
Analyse maps

- Select an area for an excavation



Excavation techniques

- Select an excavation method (1x1, strip, etc.) based on budget



Excavation techniques

- Dig in layers by clicking/draging the mouse on the ground

Excavation techniques

- Keep digging until all artifacts have been uncovered

Recovering artifacts

- Bring the recovered pieces to a safe area

Cataloging and tagging

- Add lables to each artifact piece (Location, etc.)

Recording and documentation

- Assemble the artifact

Recording and documentation

- Fill out the ceramic recording form on a clipboard/tablet
- Make a sketch and take pictures of the artifact

First level completed

- Recovered artifact gets added to the shelf as a trophy

10.12. Concept art – V2

10.13. Concept art – V4

10.14. Concept art – V5

Archaeology Game Concept

Kevin Hofbauer

Tutorial I

- Introduction and explanation of UI elements

Tutorial II

- Introducing map and computer

Choosing the first site

- Open the map and select Site A

Choosing the first site

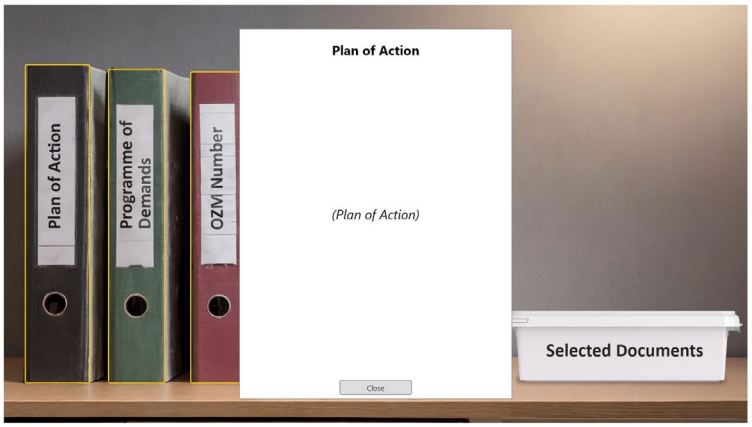
- Open the map and select Site A

Inform the municipality (Gementee)

- Select the correct documents that are needed

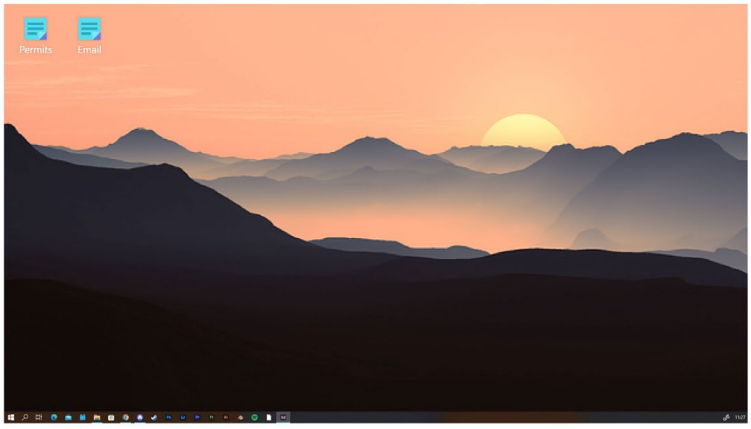
Inform the municipality (Gementee)

- Preview of the document when hovering over it



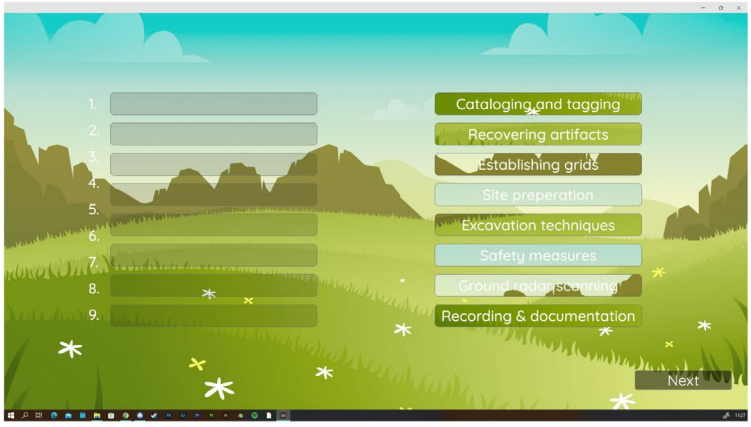
Fill out Plan of Action

- Find the password and open the computer



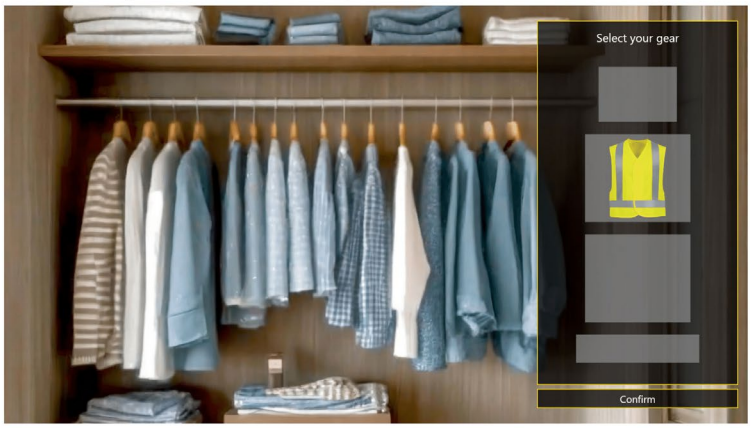
Fill out Plan of Action

- Fill out the Plan of Action on the computer



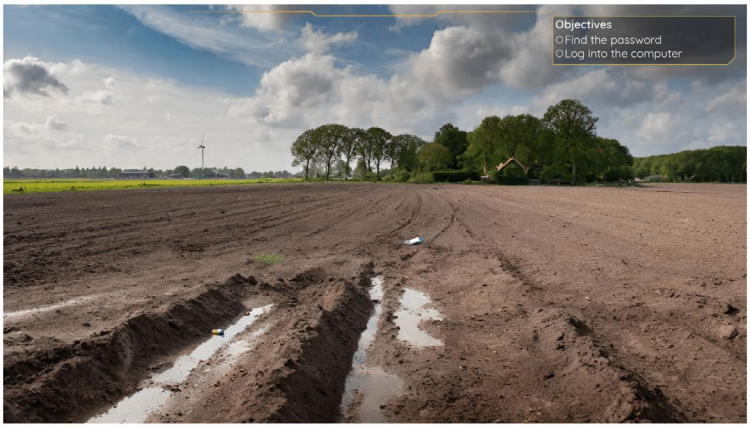
Go to the site

- Pick out the correct outfit, walk to the door, and travel to the site



Safety measures

- Walk around the site and identify potential risks



Safety measures

- Place flags/warning signs to point out hazards

Site preparation

- Clean up plants or debris that are in the way

Establish grids or sections

- Divide the site into smaller sections with spray paint

Ground radar scanning

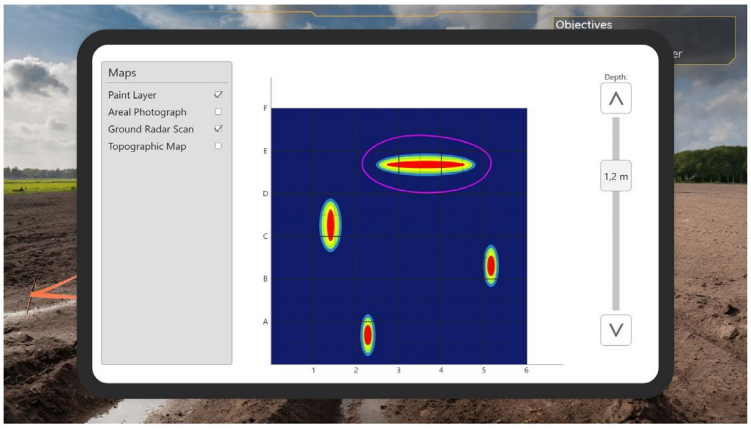
- Scan the ground with the help of a radar

Ground radar scanning

- Place tape to mark the grid

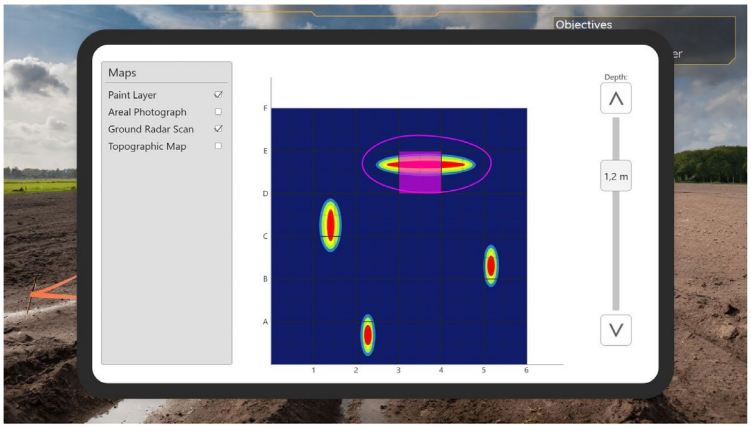
Analyse maps

- Compare the scan to other maps and highlight areas of interest



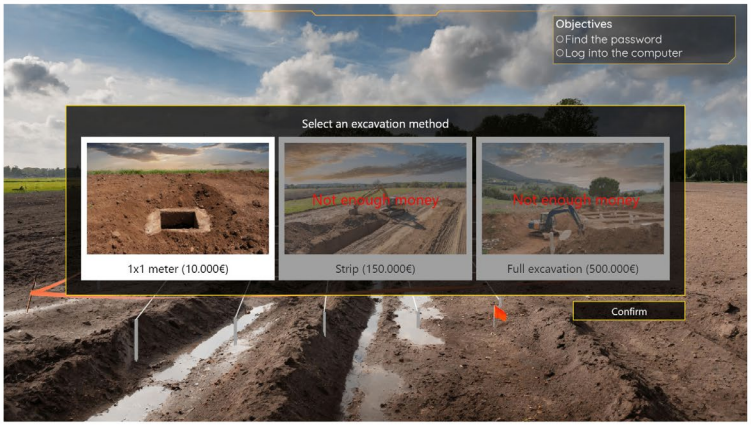
Analyse maps

- Select an area for an excavation



Excavation techniques

- Select an excavation method (1x1, strip, etc.) based on budget



Excavation techniques

- Dig in layers by clicking/draging the mouse on the ground

Excavation techniques

- Keep digging until all artifacts have been uncovered

Documentation

- Mark the location of the find on a map (excavation plan), take a photograph of the finds while still in the soil before taking them out
- Warning/talking to by the site director if they forget this step

Recovering artifacts

- Bring the recovered pieces to a safe area

Wash and dry the artifacts

Cataloging and tagging

- Add lables to each artifact piece (Location, etc.)

Recording and documentation

- Assemble the artifact

Recording and documentation

- Fill out the ceramic recording form on a clipboard/tablet
- Make a sketch and take pictures of the artifact

- Show 3d render of the reconstructed item as a reward

Small Quiz

- What do you want to do next?
    1. Onwards to the next dig!
    2. Back-fill the trenches.
    3. Write the excavation report and answer the research questions.
    4. Prepare the finds for transfer to the Provincial Repository.

Concept client feedback

Concept Feedback Summary

Feedback on the concept art and description from the client after sending the concepts per email and discussing them in the following meetings:

Feedback on Version 1 (17.03.2024, ArchaeologyGameConcept_v2.pdf):

Tutorial:

- Use 'proper' instead of 'true' archaeologist
- And mouse hover pop of on sites map to show key points (picture, name, age, culture, etc. of the site). Also the learning objectives
    - E.g.: Delphi, 300 BCE, temple site, <picture>, excavate this site (a) to learn about pottery drawing (b), learn photogrammetry (c), etc.
    - Let the player choose from two sites at the same time to give them a choice
- Add introduction when opening the site description; € instead of USD, 'exhilarating' is too much

Informing the ministry (in the Dutch legal system, both the Gemeente and the land owner should agree to the excavation):

- Have the player select from a list of documents to choose the right ones (players will only inform the Gemeente in the first level, and the ministry in the next level to not overwhelm them with too much information):
    - Required elements for Gemeente:
        - OZM number (research number), BUT this is granted by the Ministry, so they should do that step first, or be able to sidestep to that "task" and return here
        - Write a Programme of Demands (PvE), comprising a short site summary, reasons for excavation and research questions
        - Include a Plan of Action (Plan van Aanpak), in which they detail the methodology used to answer the question, provide specifics on the work plan and include a section on site safety (are there any risks? How can they be mitigated?
        - Get the documents signed by a certified senior archaeologists (KNA senior archaeologist)
    - Required for the ministry (to obtain the OZM number):
        - Draw the excavation extent on a map
        - State in which period it will be investigated (dates)
        - Declare why you are entitled to excavate (Commercial certified Unit, or University as part of training)
        - Check box to promise to inform the ministry within two weeks after excavation to present first results (this can be a nice easter egg, that

it in game time two weeks have lapsed since their first project that they get an angry email from the ministry where their first results summery is?!)
        - Check box to promise that all finds AND a final excavation report will be filed with the relevant authorities TWO years after the close of fieldwork

Planning and logistics:

- Separate PvA from Equipment:
    - PvA can be more text based
    - Equipment could be more visual (e.g. racks/walls of tools)
    - Mouse hover shows what each element is used for to guide the player in the selection
        - Goes for bags, forms, brooms, etc.
        - Each site requires a slightly different set
    - Elements in the Plan of Action: Cataloguing, site preparation, etc.

Outfit selection:

- Desired outfit: Trowel holsters, cargo pants, reinforced boots (wellingtons), tactical/fishermans vests (with pockets), etc.
    - Required: Reinforced shoes, high-visibility vest, hard hat when working with machines (digger) or deep pits
    - Advised: Long cargo pants, long sleeve blouses
    - Permitted, but not advised: Shorts and t-shirt
- Maybe add insect repellent as a joke
- Make Indiana Jones outfit as the highest one

On site:

Safety measures:

- For each danger spot, a pop-up informs the player how it is mitigated:
    - Livestock -> ask around farmer whose it is and have moved to another field
    - Mines -> end of project, call professional bomb squat
    - Oily spot -> ask municipality safety advisor and test substance, avoid area pending
    - Gas line -> ask authorities (KLIC) for map of all power lines/gaslines etc etc
- Possible hazards:
    - Cows or livestock still in the field
    - A sign denoting a gas pipe below
    - Mine sign from WW2

Site cleanup:

- Looking for animals can be integrated into the step above (safety measures)

Ground radar scan:

- Picture of the used device: https://www.geotrade.nl/pub/media/catalog/product/cache/207e23213cf636ccdef205098cf3c8a3/d/s/ds2000_1.jpg
- For large sites, quad systems are used: https://www.vision.co.uk/app/uploads/2019/03/Quadbike-gpr-scanning-in-field.jpg

Adjust budget for excavation methods:

- Drenthe start of sponsored by the Drents Prehistorische Vereniging -> 15.000€
- Next level, another society sponsors 50.000€
- Big sponsors (National Geographic and Smithsonian) sponsor 100.000€

Before securing artifact pieces:

- Record the location of finds on a map (excavation plan)
- Take a photograph of the finds as they are in the soil before taking them out
- Filling in finds tag
- Players get a warning or talking to by the site director if they try to take the artifact out before these steps

While securing the artifact, add:

- Washing and drying it
- Re-assemble it like a puzzle to reveal the reconstruction

Recording and documentation:

- Show a 3D render of the reconstructed vessel as a reward

Other:

- Leave out the “recovered artifact stored on shelf as a trophy” -> not realistic

- Logical end to a level would be to answer the research questions. Maybe add a slide at the end to ask the players what they would do next. They have to tick all the right options:
    - (1) Onwards to the next dig! (wrong)
    - (2) back-fill trenches
    - (3) write excavation report and answer research questions
    - (4) prepare finds for transfer to Provincial Repository

This led to ArchaeologyGameConcept_v5.pdf

Feedback on Version 2 (26.03.2024, ArchaeologyGameConcept_v5.pdf):

Site selection:

- Spelling mistake: Budget and goal

Informing the Gemeente:

- Add abbreviations to document names (PVA, PVE), as students are more familiar with those

Plan of action elements:

- Administrative data
- Excavation plan (detailed methodology)
- Safety plan (risks and mitigation)
- Planning (schedule)
- Sampling plan
- Permits
- Emergency plan

Filling out plan of action:

- Is not the formal plan of action
- Is more of a short overview of the steps taken to help the player
- Spelling mistake: Site preparation

Safety measures, hazards to be spotted:

- Asbestos
- Antax (lime + bones)
- Maybe mines is too much

Establishing grids:

- Done with coloured rope (red/orange) and not spray paint + numbered poles

Analyse maps:

- Spelling mistakes in Aerial photography

Excavation techniques:

- Budget adjustments:
    - 1x1: 5.000€
    - Strip: 15.000€
    - Full: 150.000€

Recovering artifacts:

- Hand hoes, instead of hand hoses

Other feedback:

- Add progress tracker (maybe footsteps or something similar to keep the style)
- Add hints after a certain amount of time has passed to allocate for students of different skill levels

This led to the final concept

10.15. First test – Testing Plan

1. Preparations

1.1. Participants

Target Audience: Game students and UI/UX experts between the ages of 18-25.

Number of Participants: 2-4

Criteria: Participants should have minimal to no prior exposure to the game concept and have knowledge about game design and/or UI/UX design.

1.2. Choosing participants

Invite students who study game design or are experts in the field.

1.3. Set up

Reserve a room at the Hanze to create a quiet testing environment. For online tests, set up a teams meeting.

1.4. Materials

Materials needed to conduct the test:

- Laptop with the Adobe XD prototype,
- Presentation and sketches of the game concept and flow,
- Microphone to record the participants answers (Phone),
- Printed consent forms for participants to read through and sign,
- Pens to sign the consent forms,
- Tablet to take notes on.

1.5. Gameplay interview questions

Questions to ask after the testers saw the game concept.

1. What do you think of the general idea?
2. Was there anything specific that you liked or did not like?
3. Do you have any ideas for other features that could be added?
4. Do you like the idea of going through all stages in one level or would you prefer to only do one task across multiple levels? For example, scan the ground on one site, then dig in the next site.

1.6. Adobe XD Interview questions

Questions to ask after the testers went through the prototype:

1. What do you think of the layout in general?
2. Did everything make sense to you?
3. Was there anything you were confused about?

2. Goals of the testing session

2.1. Objective

The objective of this testing session is to evaluate the usability and effectiveness of the lo-fi prototype menu in Adobe XD and the overall game concept, assessing the flow of the game and player interaction through the Wizard of Oz method and sketches.

2.2. Scope

The testing will focus on assessing the clarity, intuitiveness, and functionality of the prototype, as well as the opinion on the overall concept of the game.

2.3. Metrics

1. Usability: Gathering feedback on participants' satisfaction with the usability and design of the prototype.
    a. Observation:
    - Observe testers while they walk through the prototype to see if they are stuck on anything.
    - Track testers interactions during the prototype walkthrough, take notes of any points of hesitation or confusion.

    b. Thinking aloud:
    - Encourage testers to share their thoughts while navigating the prototype.
    - Ask them to share their opinions on the usability, design and any issues they encounter.
    - Take notes of what they say.

    c. Post-Test interview:
    - Conduct an interview with testers after they complete the testing session.
    - Ask questions about testers' overall satisfaction with the usability and design of the prototype.

2. Gameplay: Gathering feedback on participants' opinions on the game structure and features.
    a. Wizard of Oz:
    - Present the gameplay steps using the flowchart or a visual presentation.
    - Engage testers in a discussion about their impressions of the proposed gameplay mechanics, seeking feedback on clarity, engagement, and coherence.
    - Prompt testers to share their thoughts on how well the presented gameplay aligns with their expectations and preferences.

3. Procedure

During each testing session, I will stick to the following script to ensure that all tests follow the same procedure, and the answers will be consistent and reliable.

1. Introduction (5-10 minutes):
    - Welcome testers into the room where the test will take place. Make sure that they feel comfortable so that they feel save with giving constructive feedback.
    - Once they are seated, give them the consent form to read through and sign. Explain that I will make a recording of the testing session if they are okay with it.
    - Explain the structure of the testing session and that you will start by presenting the general gameplay and flow of the game, and then let them test the menu with a lo-fi prototype in Adobe XD.
    - Start the recording.
2. Gameplay and Flowchart Explanation (5 minutes):
    - Introduce the concept and flowchart of the game.
    - Explain that you will simulate the gameplay experience using the Wizard of Oz method with the help of a PowerPoint and sketches.
    - Keep the explanation short to maintain testers' attention.
3. Gameplay and Flowchart Interview (5-10 minutes):
    - After the Wizard of Oz simulation, ask testers for their thoughts on the gameplay and flowchart.
    - Ask them about the clarity, intuitiveness, and engagement of the concept.
4. Adobe XD Testing (5 minutes):
    - Explain the purpose of the Adobe XD testing and what testers can expect (Lo-Fi to test the layout of buttons and elements to see if everything makes sense).
    - Provide instructions for interacting with the prototype in Adobe XD (Tell them to freely try if everything works).
    - Remain available to help if testers encounter any issues.
5. Adobe XD interview (5 – 10 minutes):
    - Conclude the Adobe XD testing phase.
    - Inform testers that you will ask questions about their experience.
6. Wrap-up (5 minutes):
    - Thank testers for their participation and valuable feedback.
    - Collect any additional comments or suggestions.

10.16. First test – Notes

1. Tester 1:

Game concept notes:

- Make it click through -> you just click but the game does it for your like a tutorial, because otherwise it might be too much to do in the project.
- Clarify what you mean by “laying down tape”
- For puzzle click on assemble and it does it for you, for scope
- Do the quiz in adobe XD only, for scope

Questions:

5. What do you think of the general idea?
- Idea very good, for first year students
- Only thing, gets repetitive after doing it several time -> make future level ideas to get more difficult
- Concept in general very good

6. Was there anything specific that you liked or did not like?
- Good: action plan drag and drop; doing it before the level starts for overview
- Not so good: that everything is online -> make it clear that character is walking around the site and not you in real life
- Clarify the area, and narrow it down and help the player to find where to put flags

7. Do you have any ideas for other features that could be added?
- Nothing specific
- Maybe tutorial level, where you go through everything without doing it
- Option to change difficulty
- In first level, there are helps (transparent spots where flags should be, in future levels find it yourself)

8. Do you like the idea of going through all stages in one level or would you prefer to only do one task across multiple levels? For example, scan the ground on one site, then dig in the next site.
- Better the way it is for flow
- Informing ministry is a bit boring; make it a button that says “inform ministry” instead of having to fill out forms

- Make sure if going to computer is a good idea or just go straight to the forms -> better for gameplay and fun

Adobe XD notes:

- Add back button in map selection
- Back buttons are in different places on some screens, make sure its continuous
- Switch “choose site” and “back” button

Questions:

4. What do you think of the layout in general?
- Bit boring, but in general pretty good
- A few inconsistencies, with back buttons or confirm
- when pressing esc/menu button, show all buttons (exit game, save, main menu, settings) -> also accessible from computer and map
5. Did everything make sense to you?
- In general, yes
- See above
6. Was there anything you were confused about?
- Not really

2. Tester 2:

Game concept notes:

- Spelling mistake: **site preparation**

Questions:

1. What do you think of the general idea?
- Has a lot of educational background behind it
- Shows that it is really made for archaeology students and apply what they learn into a game
- Educational part is covered and some gamified elements are there
- Could exploid features like inventory and money more fun, to make students come back to the game

2. Was there anything specific that you liked or did not like?
- Liked: introduction – engaging from the beginning with the computer and being able to interact with it
- Did not like: A lot of steps (marking the grid, analysing maps,etc.) – was a bit hard to follow

3. Do you have any ideas for other features that could be added?
- Game is really visual – could benefit from really nice assets and art that grab the players attention and make it aesthetically pleasing
- Could focus more on rewards and money – being able to unlock more features (like clothing)

4. Do you like the idea of going through all stages in one level or would you prefer to only do one task across multiple levels? For example, scan the ground on one site, then dig in the next site.
- Separating them would be better, because then the levels are shorter and more engaging, and you could get rewards faster

Adobe XD Questions:

1. What do you think of the layout in general?

- Likes the site description
- Well structured, did not have any trouble browsing through it
- Like the location ideas, can exploit this a lot with different locations and aesthetics – each location brings different vibes and artifacts
- Back button on the computer at the top; not user friendly that you have to look down and search for it

2. Did everything make sense to you?

- Yes, everything was clear

3. Was there anything you were confused about?

- No, everything made sense

3. Tester 3:

Game concept

Questions:

1. What do you think of the general idea?

- Good idea
- Seems very educational because you have to test your knowledge, especially with preparation steps
- Not as interesting for me, as someone who does not study archaeology but probably the target group will like it

2. Was there anything specific that you liked or did not like?

- Good balance between educational content and gameplay
- Using gadgets that you use in real life in the game, like the tablet for map analysis, is nice
- Progression/unlock system helps with motivation of continuing with the game, also with unlocking new tools and gadgets

3. Do you have any ideas for other features that could be added?

- For levels: would be interesting if levels were generated procedurally, so you can play it over and over again and still be interested
- You have to bring certain tools, based on the location and terrain; and you have to do this while in the office as part of preparation

4. Do you like the idea of going through all stages in one level or would you prefer to only do one task across multiple levels? For example, scan the ground on one site, then dig in the next site.

- All in one level, so that you can remember the steps easier

Adobe XD notes:

- Main menu: not bad, very basic: would be interesting if menu points were more combined with the artwork; maybe if its in the middle
- Would be cool to have a menu that is integrated in a 3D environment (like on a laptop) to make it more unique
- Map: good concept that you have the actual map there and select the places; makes it nicer and more fitting to the game
- Small overview is also nice
- Detailed site overview is interesting and nice to read
- Maybe add function to click on pictures in the overview to zoom in on them
- Computer: would be nice if you add icons like trash can and other things, to make it fun and more interesting to look and more realistic; also real time and date
- Filling out forms: add overview of how many pages you have left to fill out and where you are; maybe also back button (unless you can only continue if you have all correct options)
- How do I know if the date is correct; all info is very basic and too easy to fill out; do more things that are related to the site overview, you that you have to read through that to get the right information; makes it more difficult
- Plan of action makes more sense to learn from in the game
- Add save button in pause menu
- Add options for accessibility (colour blindness, etc.)
- Would probably be nice to play with a controller, if you have one, but menu and computer wont allow that; maybe add dropdown list in form filling to go through each point and select one with controller

Adobe XD

4. What do you think of the layout in general?

- Good, nice idea with the computer and the map

5. Did everything make sense to you?

- Yes, very intuitive; fits to most game menus

6. Was there anything you were confused about?

- No

10.17. First test – Analysis

The testing sessions for the archaeology educational game prototype involved feedback from three testers with backgrounds in game design and related fields. The following shows an overview of the feedback provided:

Testing summary

Concept:

- Concept in general is good
- Simplify the concept in the prototype, because now the scope is too big and it might be too much to be able to finish in time (Puzzle, quiz, digging)
- Might get repetitive after some time -> make future levels more difficult or add things that make them interesting
- Check if computer is a good idea, of if it should just go straight to the forms after selecting a site
- Lots of educational background is included
- Shows that it is made for archaeology students and applies the theory into a game
- Educational part is covered and some gamified elements are there
- Could add more features like inventory and money to make it more fun and gamified, to make students come back to the game
- Seems very educational because you have to test your knowledge, especially with preparation steps

Good things:

- Plan of Action helps to know what to expect
- Introduction -> makes the game engaging from the beginning with the computer and being able to interact with it
- Good balance between educational content and gameplay
- Using gadgets that you use in real life in the game, like the tablet for map analysis, is nice
- Progression/unlock system helps with motivation of continuing with the game, also with unlocking new tools and gadgets

Not so good:

- Clarify where on the site the player can walk around and where to put flags (narrowing it down)
- Informing ministry is a bit boring -> make it a button that says “inform ministry” that does it for you
- A lot of steps in one level -> was a bit hard to follow

Feature ideas:

- Maybe tutorial level, where you go through everything but the game does the small steps for you and you just click continue
- Option to change the difficulty
- Make the first level easier with helpers, like transparent hints of where to place safety flags
- Game is very visual so nice assets and art can grab the players attention and make the game aesthetically pleasing
- Could focus more on rewards and money and being able to unlock more features, like clothing)
- For levels: would be interesting if levels were generated procedurally, so you can play it over and over again and still be interested
- You have to bring certain tools, based on the location and terrain; and you have to do this while in the office as part of preparation

Levels:

- Tester 1: The way it is right now is better (having all stages in one level) for continuous flow and not being interrupted
- Tester 2: Separating them would be better, because then the levels are shorter and more engaging, and you could get rewards faster
- Tester 3: Having all in one is better, so that you can remember the individual steps easier

Adobe XD prototype:

- Add back button in map selection
- Back buttons are in different places on some screens, make sure its continuous
- Switch “choose site” and “back” button

General opinion:

- Bit boring, but in general pretty good
- A few inconsistencies, with back buttons or confirm
- when pressing esc/menu button, show all buttons (exit game, save, main menu, settings) -> also accessible from computer and map
- Likes the site description
- Well structured, did not have any trouble browsing through it
- Like the location ideas, can exploit this a lot with different locations and aesthetics – each location brings different vibes and artifacts

- Back button on the computer at the top; not user friendly that you have to look down and search for it
- Not bad but a bit basic, could do something more creative and mix the main menu with the background (adding the buttons on the computer in a 3D space)
- Maybe add function to click on pictures in the overview to zoom in on them
- Computer: would be nice if you add icons like trash can and other things, to make it fun and more interesting to look and more realistic; also real time and date
- Filling out forms: add overview of how many pages you have left to fill out and where you are; maybe also back button (unless you can only continue if you have all correct options)
- Map: good concept that you have the actual map there and select the places; makes it nicer and more fitting to the game; small overview is also nice
- Detailed site overview is interesting and nice to read

Did everything make sense:

- In general, yes, just back buttons were on different places sometimes
- Yes, everything was clear
- Yes, very intuitive; fits to most game menus

Anything you were confused about:

- Not really
- No, everything was clear
- No

Iterations

Based on the feedback received from testers, several iterations can be made to improve the game concept and Adobe XD prototype:

Game Concept Iterations:

- Enhance gamification elements to increase player motivation and engagement.
- Provide clearer instructions for actions and tasks within the game.
- Clarify the area and narrow it down and help the player to find where to put flags.
- Option to change difficulty.
- Think about generating levels procedurally, so you can play it over and over again and still be interested.
- Add a tutorial level to introduce players to game mechanics gradually.

Adobe XD Prototype Iterations:

- Ensure consistent button placement and functionality across screens.
- Add back button in map selection.
- Back buttons are in different places on some screens, make sure it's continuous.
- Switch 'choose site' and 'back' button in site overview.
- Add function to click on pictures in the overview to zoom in on them in site overview.
- Filling out forms: add overview of how many pages you have left to fill out and where you are.
- Add save button in pause menu.
- Add options for accessibility (colour blindness, etc.).
- Adjust menu to be interactable with a controller as an option.
- Maybe add function to click on pictures in the overview to zoom in on them
- Computer: would be nice if you add icons like trash can and other things, to make it fun and more interesting to look and more realistic; also real time and date

By implementing these iterations, the game prototype can be refined to provide an improved and more engaging experience for first-year students learning about archaeology fieldwork. Additionally, ongoing testing and iteration cycles will ensure continuous improvement and optimization of the game's educational value and usability.

10.18. First test – Reflection

Testing reflection

What went well:

- *Testing Setup*: A Laptop, a tablet and a straightforward setup ensured a smooth testing procedure without distractions, allowing for efficient feedback gathering.
- *Online tests:* Conducting online tests on Microsoft teams was very effective, as it ensured a stable connection and allowed for a clean recording.
- *Comfortable Testers*: Testers felt at ease during the sessions, promoting honest user insights. A positive testing atmosphere encouraged candid communication and improved feedback quality.
- *Information Gain*: The testing sessions uncovered several design flaws and provided valuable feedback.
- *Note-Taking Effectiveness*: Taking notes during testing enhanced the ability to analyse tester interactions, uncover and document bugs, and collect feedback for reference. These notes facilitate post-test analysis and support ongoing improvements in the testing process.

What to improve upon next time:

- *Screen Recordings*: Using screen recordings to look back on testers interactions with the prototype and identify areas they got stuck in.
- *Follow-Up Questions*: Ask follow-up questions in the post-test interview to gather more detailed information.
- *Pre-test Rehearsal*: Practice the testing script beforehand to avoid getting stuck and losing my train of thought.

Advantages and Disadvantages of Peer Testing

Advantages:

- *Feedback from Experienced Game Designers*: Peer testing provides the opportunity to gather feedback from individuals with expertise in game design and UI/UX design. Their insights can offer valuable perspectives and identify potential issues that might have been overlooked.
- *Diverse Perspectives*: Testers from different backgrounds can bring diverse perspectives to the testing process, offering insights from various angles and enhancing the overall quality of feedback.
- *Validation of Lo-Fi Prototypes*: Peers can provide validation for lo-fi prototypes and concept ideas.

Disadvantages:

- *Divergence from Target Audience Opinions*: Peers may have different opinions and preferences compared to the target audience. While their feedback is valuable, it's essential to balance it with insights from the actual end users to ensure the product meets their needs and expectations.
- *Potential Bias*: Peers may unintentionally show bias in their feedback, influenced by their own experiences, preferences, or professional background. It's important to consider this potential bias when interpreting feedback and making decisions based on it.

Overall Reflection:

The testing was generally effective, with positive tester input and useful insights. Tester comfort and the data gathered show the testing process's value. I could, however, improve in several areas, practicing my script better beforehand and implementing screen recordings and follow-up questions. As for the testing method, peer testing was very useful in this stage of the design cycle, as they were able to evaluate the lo-fi prototype professionally and give qualitative feedback on the game concept. This was especially helpful, as they knew the process behind developing a game and could therefore advise me on the scope and give creative ideas for other features to implement. They could, however, have different opinions than the target audience, especially regarding the game concept, which could influence the success of the game.

10.19. Second test – Testing Plan

1. Preparations

1.1. Participants

Target Audience: Game design students between the ages of 18-25.

Number of Participants: 2-4

Criteria: Participants should have minimal to no prior exposure to the Unity version of the game.

1.2. Choosing participants

Invite students who study game design or are experts in the field.

1.3. Set up

Reserve a room at the Hanze to create a quiet testing environment. For online tests, set up a teams meeting.

1.4. Materials

Materials needed to conduct the test:

- Laptop with the Unity and Adobe XD prototype,
- Microphone to record the participants answers (Phone),
- Printed consent forms for participants to read through and sign,
- Pens to sign the consent forms,
- Tablet to take notes on.

1.5. Adobe XD Interview questions

Questions to ask after the testers went through the prototype:

Usability:

1. How intuitive was the menu layout and navigation in the prototype?
2. Were you able to easily find and access different menu options?
3. Did you encounter any difficulties or confusion while navigating through the menu screens?
4. Were there any features or functionalities you expected to find in the menu that were missing or unclear?

Art Style/Colours:

1. What are your thoughts on the overall visual design and art style of the menu prototype?
2. Did the colour scheme and visual elements of the menu enhance or detract from its usability and appeal?
3. Were the colours used in the menu prototype easy on the eyes and aesthetically pleasing?

General Feedback:

1. What aspects of the menu prototype did you find most appealing or user-friendly?
2. Were there any specific areas of the menu prototype that you think could be improved for better usability or visual appeal?

1.6. Unity interview questions

Questions to ask after the testers went through the Unity prototype.

Art Style/Graphics:

1. How would you describe the art style and graphics of the game? What do you think about the 3D models and textures?
2. Did the art style make the game better or worse for you?
3. Were the visuals clear and visually appealing?
4. Did you encounter any issues with the art style or graphics that affected your gameplay experience?
5. Was there anything about the art that stood out for you, positively or negatively?

Immersion:

1. Did you feel like you were really in the virtual world while playing the game?
2. What elements of the game contributed most to your sense of immersion?
3. Were there any aspects of the game that broke your immersion?
4. Do you think sound effects would contribute to your immersion?

Difficulty:

1. Was the game easy, just right, or too hard for you?
2. Did you understand everything you had to do?
3. Did the difficulty level impact your enjoyment of the game?

Understanding of Gameplay:

1. Did you understand what you were supposed to do in the game?
2. Were the instructions clear and easy to understand?
3. Was there anything that confused you or made you unsure about what to do next?

General Questions:

1. What parts of the game did you enjoy the most?
2. What was missing in the game or needs improvement?
3. Would you use this game to learn about archaeological excavations?
4. Do you have any suggestions to improve the educational part of the game?

10.20. Second test – Notes

Test 1 – Sophie

Adobe XD

Looks good but a bit inconsistent

Buttons in menu transparent, but in the forms page its different

Focus on one art style and make it consistent, also colors should be matching

Main menu background looks nice, maybe put laptop on table, like in the game; then it makes more sense why the buttons are on the left (draw attention to the table)

Buttons a bit inconsistent (dialogue part and choosing site)

Usability:

1. **How intuitive was the menu layout and navigation in the prototype?**

Was quite intuitive, but map and computer stuff are a bit confusing; maybe makes more sense to archaeology students

For me I just want to do my excavation and get to the point

But intuitive in the sense of easy to manage and getting through everything

2. **Were you able to easily find and access different menu options?**

Yes, most of the time, but some of the buttons didn't work (back buttons)

Still don't like the esc (pause) part; esc should mean leaving the game instead of bringing it to the menu; should say menu

3. **Did you encounter any difficulties or confusion while navigating through the menu screens?**

Not, except for mentioned above

4. **Were there any features or functionalities you expected to find in the menu that were missing or unclear?**

Just the esc button; otherwise, self-explanatory

Add option to open the menu on every screen

Art Style/Colours:

1. **What are your thoughts on the overall visual design and art style of the menu prototype?**

Quite like it (dark colours, old profession); makes sense and is archaeology vibe

A bit inconsistent in the filling out the words (green and colourful) – have a source to back up why it looks this way

Dark colours good for uni and study vibe; other part is giving Duolingo and fun vibes

2. **Did the colour scheme and visual elements of the menu enhance or detract from its usability and appeal?**

Keep the background image in the 'enter company name' part, etc. but make it blurry, because now it's a bit boring; then its more consistent

3. **Were the colours used in the menu prototype easy on the eyes and aesthetically pleasing?**

I think so, but like said before, in the forms part they are nice but give off a completely different vibe; focus on one because it's a bit confusing to have both

General Feedback:

1. **What aspects of the menu prototype did you find most appealing or user-friendly?**

Really like the map; cross could be a bit more visible; could be a cool feature if you have multiple points to choose from

Also, like background picture in main menu

2. **Were there any specific areas of the menu prototype that you think could be improved for better usability or visual appeal?**

Consistency of all buttons

Menu buttons: Vibe of the excavation tools is nice but make it more visible or make it stand out more; esp with white windows in the back, the focus should be on the buttons and not on the background

Not the biggest fan of the computer; doesn't look that nice; icons could be a bit prettier; colors could be better

Filling out form is a completely different game

Have a justification of why they are so different or have it seamless and blend in more

Unity

Compass makes sense but put an actual compass there

Make document selection more clear

Art Style/Graphics:

1. **How would you describe the art style and graphics of the game? What do you think about the 3D models and textures?**

Looks good, like how the map rolls out

Many parts are not finished (vests, etc.)

Don't like the background when logging in the computer (houses are confusing)

2. **Did the art style make the game better or worse for you?**

I like it (map and everything), was easy on the eyes

3. **Were the visuals clear and visually appealing?**

Yes, but computer background was confusing;

Forms page was a bit ugly, didn't match the theme of before

4. **Did you encounter any issues with the art style or graphics that affected your gameplay experience?**

Forms fill out a bit plain and ugly; everything is nice and interactive, but that part is a bit underwhelming in comparison

5. **Was there anything about the art that stood out for you, positively or negatively?**

Don't think so

Immersion:

1. **Did you feel like you were really in the virtual world while playing the game?**

Yes, especially camera was very stable

2. **What elements of the game contributed most to your sense of immersion?**

Camera being so stable, and the room looked really finished and done

3. **Were there any aspects of the game that broke your immersion?**

Computer

4. **Do you think sound effects would contribute to your immersion?**

Personally, hate sound effects in games, always mute everything because I don't like them

Maybe it could help other people

Difficulty:

1. **Was the game easy, just right, or too hard for you?**

Was at the easy side but was just right for the beginning

Couldn't play the actual game yet, but that might be difficult for me because I don't know the steps

Didn't feel too difficult, was intuitive

2. **Did you understand everything you had to do?**

I think so, yes

Except for the computer: thought you had to put it into the right order

3. **Did the difficulty level impact your enjoyment of the game?**

No, was good

Understanding of Gameplay:

1. **Did you understand what you were supposed to do in the game?**

Yes

2. **Were the instructions clear and easy to understand?**

Yes for sure

3. **Was there anything that confused you or made you unsure about what to do next?**

Computer

General Questions:

1. **What parts of the game did you enjoy the most?**

The starting part, like the room, looks good and nice

2. **What was missing in the game or needs improvement?**

don't think so

3. **Would you use this game to learn about archaeological excavations?**

Not sure, if I want to learn it, I don't want to do the extra steps like filling out forms, and just go to excavations

But if I was a student and I had to know all these steps then yes

4. **Do you have any suggestions to improve the educational part of the game?**

No, but looking forward to see the gameplay part of it

Other:

Empathize time and date in computer in the report and say that its to immersion

Test 2 – Silke

Questions for adobe:

Usability:

1. **How intuitive was the menu layout and navigation in the prototype?**

- The menu layout was good and clear.

2. **Were you able to easily find and access different menu options?**

- Yes.

3. **Did you encounter any difficulties or confusion while navigating through the menu screens?**

- No.

4. **Were there any features or functionalities you expected to find in the menu that were missing or unclear?**

- I don't think so. I only broke it when I left the game.

Art Style/Colours:

1. **What are your thoughts on the overall visual design and art style of the menu prototype?**

- I think the menu had a little bit of a basic design to it, it didn't feel as archeologist/adventurer themed as the rest of the game.

2. **Did the colour scheme and visual elements of the menu enhance or detract from its usability and appeal?**

- It didn't detract from usability or appeal of the game as a whole but I don't think it matched the rest of the game's feel with the colors.

3. **Were the colours used in the menu prototype easy on the eyes and aesthetically pleasing?**

- They were easy on the eyes, I think the use of warmer colors like browns/reds, beige/dull yellows (like sand color) would fit the aesthetic a bit more.

General Feedback:

1. **What aspects of the menu prototype did you find most appealing or user-friendly?**

- I thought it was easy to read and the design was clean

2. **Were there any specific areas of the menu prototype that you think could be improved for better usability or visual appeal?**

- Only with the question about the colours. The rest I don't have any ideas on.

Unity:

Game breaks when going out of the game or opening the menu while dialogue is open

Intro dialogue (compass) spelling mistake: At the top right corner

Maybe highlight the tasks in the dialogue

Archis: Explain that you have to drag the documents and what exactly the user has to do

Computer canvas does not fit the camera in some resolutions

Explain closet better (that you have to drag) and make the areas more visible

Art Style/Graphics:

1. **How would you describe the art style and graphics of the game? What do you think about the 3D models and textures?**

- I think the graphics look great. Good quality everything looks well made and the lighting is really nice.

2. **Did the art style make the game better or worse for you?**

- I think better. It did have an adventure-esque feeling in the artstyle. Like old world explorer off to uncover the secrets of the earth type vibe.

3. **Did you encounter any issues with the art style or graphics that affected your gameplay experience?**

- My only issues were with the UI, not knowing how to close/back out of things or what exactly to click. The rest was well done. And also the sticky note glowed really bright for some reason.

4. **Was there anything about the art that stood out for you, positively or negatively?**

- AS I said before the lighting was well done to bring in the sunlight look.

Immersion:

1. **Did you feel like you were really in the virtual world while playing the game?**

- Yes. The mouse felt quite sensitive but that may have been my own mouse settings. I think the interior design and the lighting complimented each other very well and helped greatly with immersing myself into the game world.

2. **What elements of the game contributed most to your sense of immersion?**

- The art contributed a lot, I think. I also loved the map unrolling on the desk and being called an adventurer in the tutorial.

3. **Were there any aspects of the game that broke your immersion?**

- Only UI bugs/glitches and other work in progress bits of the game. There were no design choices that broke my immersion.

4. **Do you think sound effects would contribute to your immersion?**

- I think sound effects would be quite nice, like some footsteps and interaction sounds. But I didn't even notice the lack of sound so for me it's not super important.

Difficulty:

1. **Was the game easy, just right, or too hard for you?**

- So far it wasn't so hard, I mostly just got stuck because I messed up the UI or something. It was easy to follow and figure out otherwise.

2. **Did you understand everything you had to do?**

- Yes, the instructions made sense.

3. **Did the difficulty level impact your enjoyment of the game?**

- Not at all.

Understanding of Gameplay:

1. **Did you understand what you were supposed to do in the game?**

- Yes, the flow made sense.

2. **Were the instructions clear and easy to understand?**

- Yes they were very clear for the most part.

3. **Was there anything that confused you or made you unsure about what to do next?**

- There could be a close button or popup to say you can close out of the computer/map/clothing selection with e. I would also make it so that the computer is not click-able until after you've opened the map and/or looked at the sticky note.

General Questions:

1. **What parts of the game did you enjoy the most?**

- I really like the concept and the art style. I also like the small objective of picking up the trash in the beginning, it gives a good little 'introduction' to using e to interact with things.

2. **What was missing in the game or needs improvement?**

- I think just general continuation of the project and bug fixes should be the next goal.

3. **Would you use this game to learn about archaeological excavations?**

- Yes I think it would be a really fun way to learn.

4. **Do you have any suggestions to improve the educational part of the game?**

- So far I think there's not too much of an educational side yet, that'll probably come later. Which I think should clearly explain the purpose and the importance of the actions and/or tools the player will use.

Test 3 – Marta

Adobe

Likes details of buttons in the menu

Colours and aesthetics fit to concept and background colours

Buttons can still be polished a bit; maybe test different versions and experiment a bit

Very intuitive and easy to navigate through

Company name page doesn't fit the menu (dark blues compared to reds); big contrast

Like having the objectives clearly visible

Site into is too much information; idea is nice but I wouldn't read this much

Map itself is really nice

Forms page is immersive (being able to look into the computer); fit into the topic of it being educational

Questions:

Usability:

5. **How intuitive was the menu layout and navigation in the prototype?**

Very intuitive, found everything

6. **Were you able to easily find and access different menu options?**

Yes

7. **Did you encounter any difficulties or confusion while navigating through the menu screens?**

No

8. **Were there any features or functionalities you expected to find in the menu that were missing or unclear?**

No

Art Style/Colours:

1. **What are your thoughts on the overall visual design and art style of the menu prototype?**

Liked it

2. **Did the colour scheme and visual elements of the menu enhance or detract from its usability and appeal?**

Enhanced it, but it gives more of a sci-fi vibe than archaeology, maybe you could make it fit better

3. **Were the colours used in the menu prototype easy on the eyes and aesthetically pleasing?**

Yes

General Feedback:

1. **What aspects of the menu prototype did you find most appealing or user-friendly?**

Not too complicated, everything was easy to find

2. **Were there any specific areas of the menu prototype that you think could be improved for better usability or visual appeal?**

You could make it fit more to the archaeological style as the rest of the game, because now it seems very general

Unity:

Menu really intuitive and looks nice

Title position is good, font could be better

Like that objectives and compass showed up instantly and that tutorial interactive

Like that it looks realistic, also outside

'press e to interact' and highlight is nice

Like the idea of having different outfits; makes it more personal

Like the map animation

Small bug that it overlaps "press e" with dialogue

Looking at note is a bit difficult because of sun glare

Not clear how to drop note again

Computer interface looks nice

Likes that computer screen stays

Likes the site environment

Art Style/Graphics:

1. **How would you describe the art style and graphics of the game? What do you think about the 3D models and textures?**

Really realistic and fit with the concept of the game being educational (has to be realistic for students to experience that

2. **Did the art style make the game better or worse for you?**

Made it a lot better; they look really nice and help with immersion

3. **Were the visuals clear and visually appealing?**

Assets were perfect; UI is on the right track UX wise, but room for improvement on the visual aspect to fit more to the actual concept, they feel very general now and could be put into every other game

4. **Did you encounter any issues with the art style or graphics that affected your gameplay experience?**

Just the bugs

5. **Was there anything about the art that stood out for you, positively or negatively?**

positive: all very bright and felt expansive because of the background; felt like there was an actual environment there

Immersion:

1. **Did you feel like you were really in the virtual world while playing the game?**

Yes

2. **What elements of the game contributed most to your sense of immersion?**

Especially the backgrounds

3. **Were there any aspects of the game that broke your immersion?**

The placeholders

4. **Do you think sound effects would contribute to your immersion?**

Yes

Difficulty:

1. **Was the game easy, just right, or too hard for you?**

Was just right

2. **Did you understand everything you had to do?**

Yes

3. **Did the difficulty level impact your enjoyment of the game?**

The fact that it was easy made it more enjoyable

Understanding of Gameplay:

1. **Did you understand what you were supposed to do in the game?**

Yes

2. **Were the instructions clear and easy to understand?**

Yes

3. **Was there anything that confused you or made you unsure about what to do next?**

No

General Questions:

1. **What parts of the game did you enjoy the most?**

The actual level (placing and picking up stuff)

2. **What was missing in the game or needs improvement?**

The UI

3. **Would you use this game to learn about archaeological excavations?**

Yes

4. **Do you have any suggestions to improve the educational part of the game?**

Maybe at the end of every level, have a conclusion page that you can skip

Has everything form the level summarized

Test 4 – Fabian

Adobe

Button symbols very nice; would be interesting if you add different tools for different buttons

Background room looks very nice

Would be more realistic if lamp did not shine directly in screen, but more on the table

Keyboard and mouse missing

Pattern on the wall in the background is pixelated

Border around objectives looks nice; colour fits and the corner looks nice

Map: red and green too strong; make it a softer colour like the rest of the game and the map itself

Would be nice if pictures were clickable

Maybe add full screen and minimize button in the site overview, even if they are not useable; maybe computer theme does not fit to the map; maybe make it look like a piece of paper and have other design for close button and choose design

Computer background looks a bit pixelated

Forms page: make background fit to the site location or make it more consistent with the rest of the game; colours very bright, but has something nice to it; continue button is missing

Planning background image should also match the site location (jungle, field, dessert, etc.)

Select documents is very different than rest of the computer screen and very empty

Would be cool if it look like an email program so you really have to send documents

Pause menu: current stage is nice and the progress footsteps

Colours of the menu look nice; the blue tone

New game screen looks very nice; how it fades on the sides

Main menu background: floor looks like concrete; maybe add trophies on the wall and computer and other details

Cables are missing in the lamp and computer monitor (could add the keyboard and mouse in the drawer of the table, like some people have)

Maybe add a button to exit the game in the bottom left corner on the computer

Questions:

Usability:

1. **How intuitive was the menu layout and navigation in the prototype?**

Very intuitive

2. **Were you able to easily find and access different menu options?**

computer apps and menu points were easy to find

3. **Did you encounter any difficulties or confusion while navigating through the menu screens?**

No confusion; concept with the map looks very nice; would be cool if there was a third element in addition to the computer and map

4. **Were there any features or functionalities you expected to find in the menu that were missing or unclear?**

Save and load button in the pause menu; back and continue button in forms filling page and page number would be nice: no back button on the map

Antarctica is missing

Art Style/Colours:

1. **What are your thoughts on the overall visual design and art style of the menu prototype?**

Very good and fits the mood (with landscapes in computer background fit to archaeology)

Footprints add Indiana Jones flair

Room is very nice

Map is also very pretty, except for red and green colours (a bit too strong)

Font also fits

2. **Did the colour scheme and visual elements of the menu enhance or detract from its usability and appeal?**

Colours in the forms page and the images are a bit strong, makes the text difficult to read; images in the fields also make it too easy; better if background are in a solid colour

3. **Were the colours used in the menu prototype easy on the eyes and aesthetically pleasing?**

Yes, for sure

General Feedback:

1. **What aspects of the menu prototype did you find most appealing or user-friendly?**

User friendly: That the computer is very much like in real life, so you know where everything is supposed to be

Appealing: the map

2. **Were there any specific areas of the menu prototype that you think could be improved for better usability or visual appeal?**

Mentioned before

Unity:

Door is a bit too white

Garbage objects say 3/10 but there are only 3 garbage objects

Computer outline visible through the screen

Map animation is nice; but canvas opens too soon

Bug when you close the site overview; cannot select the site anymore after that

Would be nice if items in the compass stay on top instead of moving up and down

Text too long after selecting the site

Note too bright and controlling it is very confusing

Computer login c is confusing; makes it sound like c for clear

Computer background is confusing and makes it look like you are in a 3d scene

Would be good if objectives stayed when looking at the computer so that you know what to click

Make x in bottom left corner of computer clickable

Add option to go out of the computer/map with esc; OR be able to open the menu while in computer/map

Closet menu looks cool

If you add a loading screen: picture of the map with a dashed line between you and the site and you travel to the site

Questions:

Art Style/Graphics:

1. **How would you describe the art style and graphics of the game? What do you think about the 3D models and textures?**

Not a AAA game, but looks really good; shows that you put in effort; art style looks nice and fits to the educational theme

Textures look good and 3D models look nice; many placeholders but on a good track

2. **Did the art style make the game better or worse for you?**

Made it better because it fits

3. **Were the visuals clear and visually appealing?**

Yes

4. **Did you encounter any issues with the art style or graphics that affected your gameplay experience?**

No difficulties with art style and graphics

5. **Was there anything about the art that stood out for you, positively or negatively?**

Main office is very nice (walls and floor textures)

Site is still very empty

Immersion:

1. **Did you feel like you were really in the virtual world while playing the game?**

No, because it's a game; full immersion was if it was a VR game; game would be nice in VR

2. **What elements of the game contributed most to your sense of immersion?**

Interactions with all objects (map, computer, closet)

3. **Were there any aspects of the game that broke your immersion?**

Unfinished parts of the game; maybe having to put the trash into a trashcan would add to immersion, but not necessary

4. **Do you think sound effects would contribute to your immersion?**

Would add a lot; also music in the menu/office and walking sounds depending on the ground would help with immersion; also click sounds when clicking on something on the computer; maybe windows error sound when you do something wrong

Difficulty:

1. **Was the game easy, just right, or too hard for you?**

Seems very easy; feels like a walk in the park; which is fine because not every game has to be difficult; would not know how to make it difficult

2. **Did you understand everything you had to do?**

Yes

3. **Did the difficulty level impact your enjoyment of the game?**

No, was very good; more of a game that you experience and learn from

Understanding of Gameplay:

1. **Did you understand what you were supposed to do in the game?**

Yes

2. **Were the instructions clear and easy to understand?**

Yes

3. **Was there anything that confused you or made you unsure about what to do next?**

The part of not seeing your objective in the computer and having to go out; maybe add a way to add the objectives with notes/notepad app or something

General Questions:

1. **What parts of the game did you enjoy the most?**

Fun of exploring the game because I did not play it before; but I think the fun part will come later on the site when it is finished

2. **What was missing in the game or needs improvement?**

Improvements mentioned before

Missing: biggest worry is that you can finished the game fast in all levels and keeping the motivation to keep playing; maybe money/unlocking stuff with future levels would help

3. **Would you use this game to learn about archaeological excavations?**

Probably not, because I am not interested in the topic, but if I was an archaeology student I would play it to learn about the topic

4. **Do you have any suggestions to improve the educational part of the game?**

Maybe add some variety in some parts, like the drag and drop, for future levels

Also having to use different tools in detail and make them different in every level; also if you can make mistakes and you have to do them correctly would also add to difficulty

10.21. Second test – Analysis

Test 2 Summary

Adobe XD Prototype:

Usability:

1. Menu Layout and Navigation:
    - Most testers found the menu layout and navigation intuitive, although some felt that certain elements like the map and computer interface were a bit confusing.
    - One tester suggested that the menu layout might make more sense to archaeology students specifically.
    - Suggestions were made to improve the visibility and functionality of certain buttons, such as the back button.
2. Accessing Menu Options:
    - Testers were generally able to find and access different menu options easily, although there were some issues with certain buttons not working as expected.
3. Navigation Difficulties:
    - Apart from the mentioned issues, testers didn't encounter significant difficulties or confusion while navigating through the menu screens.
4. Missing Features:
    - The main missing feature identified was the absence of an explicit "menu" option instead of the "esc" button.
    - Testers also suggested adding options to open the menu on every screen and include save/load buttons, back buttons, and page numbers.

Art Style/Colours:

1. Visual Design and Art Style:
    - The overall visual design and art style were generally well-received, with positive feedback on the dark colour scheme and archaeological vibe.
    - However, some testers found certain elements, like the form-filling pages, to be inconsistent in style and colour.
2. Colour Scheme and Visual Elements:
    - While the majority of testers found the colour scheme and visual elements appealing, some suggested improvements to make certain elements more visually consistent with the game's theme.
3. Aesthetically Pleasing Colours:
    - Most testers found the colours used in the menu prototype easy on the eyes and aesthetically pleasing.

General Feedback:

1. Appealing and User-Friendly Aspects:
    - Testers appreciated various aspects of the menu prototype, such as the map and the computer interface's similarity to real-life setups.
2. Areas for Improvement:
    - Consistency of all buttons was highlighted as an area for improvement.
    - Some testers suggested making certain elements, like the excavation tools in the menu, more visible.
    - The computer interface received mixed feedback, with suggestions to improve its appearance and functionality.
    - The form-filling section was criticized for being visually inconsistent with the rest of the game.

Unity Prototype:

Art Style/Graphics:

1. Art Style and Graphics:
    - Testers generally liked the art style and graphics of the game, although some felt that certain elements, such as vests, were unfinished.
    - Feedback was provided on specific visual elements, such as the background when logging into the computer.
2. Impact of Art Style:
    - Most testers felt that the art style enhanced their gaming experience and matched the game's theme.
3. Visual Clarity and Appeal:
    - While most testers found the visuals clear and visually appealing, some felt that certain elements, like the form-filling pages, didn't match the overall theme.
4. Issues with Art Style/Graphics:
    - Some testers encountered issues with the art style or graphics, particularly in the form-filling section.
5. Notable Visual Elements:
    - Positive feedback was given on various visual elements, such as the bright and expansive environment and the textures and models used.

Immersion:

1. Sense of Immersion:
    - Testers had mixed opinions on whether they felt immersed in the virtual world.
    - Elements such as stable camera views and realistic graphics and sound effects were highlighted as contributing to immersion.
2. Contributing Elements:
    - Stable camera views and realistic graphics were mentioned as significant contributors to immersion.
3. Aspects Breaking Immersion:
    - Some testers felt that certain elements, like the computer interface and menu, broke their immersion.
4. Sound Effects for Immersion:
    - While some testers personally disliked sound effects in games, most agreed that they would contribute to immersion, particularly with sounds of excavation in the background.

Difficulty:

1. Game Difficulty:
    - Testers generally found the game's difficulty level to be appropriate, although they had yet to experience the actual gameplay.
2. Understanding Gameplay:
    - Most testers felt that they understood what they were supposed to do in the game, although some found certain elements, like the computer interface, confusing.

General Questions:

1. Enjoyable Parts of the Game:
    - Testers enjoyed various aspects of the game, such as the starting room and the overall visual design.
2. Areas Needing Improvement:
    - While some testers didn't feel that anything was missing from the game, others suggested improvements to the computer interface and adding more activities in the office.
3. Educational Value:
    - Testers had mixed opinions on whether they would use the game to learn about archaeological excavations, with some suggesting that it would be useful for students.
4. Suggestions for Educational Improvement:
    - No specific suggestions were made to improve the educational aspect of the game.

Iterations

Adobe XD:

- Make design more consistent:
    - Buttons: Site info on the map and forms page buttons are different than menu buttons; main menu buttons can also be a bit more polished
    - Colours and art style: Forms page on the computer is too colourful in comparison to the rest of the game
    - Dialogue field and button: Make them blend in more with the theme of the rest of the game
- Make buttons in the main menu stand out more/more visible, because they blend in too much, especially with the bright windows
- Add more details and eye-catching content in the main menu background
- Add the same background image as the menu in the other parts, such as 'Enter company name', to make it more consistent; or make the colours fit more to the main menu with dark reds
- Change computer icons to fit more into the art-style
- Iterate on menu to give it more of an archaeologist/adventurer theme, to match the rest of the game: Warmer colours like brown/red, beige/dull yellow (like sand) would fit more
- Site information is too much text, make it less to read through
- Add save/load button in the pause menu

Unity:

1. **UI/UX:**

- Change background image of the computer: now it's confusing and makes it look like you are in a 3D scene
- Make forms page more clear:
    - Explain that you have to pick the correct documents and not place them in the right order
    - Explain that you have to drag the documents into the fields
    - Make it more clear what buttons you can press
- Computer:
    - Make the design of the forms page fit more to the rest of the game
    - Add more icons like trash can or folders to make it less empty and more realistic (adds to immersion)
- Make the UI more specific for archaeology, now it feels very general
- Explain the compass better and what the elements and text mean
- Fix compass red squares
- Make the closet more clear:

    - Explain that you have to drag the items
    - Explain that you need one of each (vest, hat, pants)
    - Make the slots more visible
- Make sticky note glow less bright (now it's a bit difficult to read)
- Add settings, especially for mouse sensitivity
- Add a text or button that explains how to exit the computer/map/closet/notes
- Be able to exit the computer/map/closet/notes with esc
- Game title font could be better to fit the theme more
- If there is a loading screen, make it a map with a dashed line of the player traveling to the site

2. Gameplay

- Add sounds for footsteps and UI interactions
- Make computer not interactable until you opened the map or the sticky note
- Make sure to explain the importance of each action for the educational part
- Add a conclusion page at the end of every level to summarize what the player learned
- Add detailed mechanics to tools that vary in levels to keep the game interesting

3. Bugs:

- Game breaks when going out of the game or opening the menu while dialogue is open
- 'Press E to interact' text overlaps with the dialogue field

10.22. Second test – Reflection

Testing reflection

What went well:

- *Online tests were consistent:* The online testing process was reliable and consistent across all testers, ensuring uniformity in the feedback received.
- *Screen recordings:* Recorded screens provided a clear visualization of user interactions for post-test analysis.
- *Gained lots of information and feedback:* Testers provided valuable insights and feedback, highlighting various aspects that need improvement, leading to a comprehensive list of areas for iteration.
- *Many interview questions:* Increased the number of questions from the previous test, resulting in more detailed feedback and a better understanding of user preferences and issues.

What to improve upon next time:

- *Reintroduce audio recording:* In addition to screen recordings, capturing audio would provide better evidence and insight into user interactions while reducing the necessary file size.
- *Too many questions:* The number of questions should be reduced to prevent fatigue and ensure testers provide detailed responses throughout the test, as their answers were very short towards the end.

Advantages and Disadvantages of Peer Testing:

The advantages and disadvantages of peer testing stayed mostly the same as in the previous evaluation:

Advantages:

- *Feedback from Experienced Game Designers*: Peer testing provides the opportunity to gather feedback from individuals with expertise in game design and UI/UX design. Their insights can offer valuable perspectives and identify potential issues that might have been overlooked.
- *Diverse Perspectives*: Testers from different backgrounds can bring diverse perspectives to the testing process, offering insights from various angles and enhancing the overall quality of feedback.
- *Validation of Hi-Fi Prototypes*: Peers can provide validation for the hi-fi and Unity prototypes.

Disadvantages:

- *Divergence from Target Audience Opinions*: Peers may have different opinions and preferences compared to the target audience. While their feedback is valuable, it's essential to balance it with insights from the actual end users to ensure the product meets their needs and expectations.
- *Potential Bias*: Peers may unintentionally exhibit bias in their feedback, influenced by their own experiences, preferences, or professional background.

Overall Reflection:

This evaluation was very successful, as testers expressed many positive feedback points about the prototypes, while also generating an extensive list of future iterations to work on. Using screen recordings was very useful for post-test analysis and rewatching the footage. This media, however, does not seem feasible as evidence in the long run, as it takes up a lot of storage, and it is very time consuming to process (editing the video to cut out beginning and ending and rendering it). Having more interview questions proved to be very helpful in getting more data, however, I will limit my questions to a maximum of two pages and make use of more multiple choice answers, to avoid fatigue in testers, which could impact the quality of the feedback.

10.23. Third test – Testing Plan

1. Preparations

1.1. Participants

Target Audience: Archaeology students between the ages of 18-25.

Number of Participants: 5+

Criteria: Participants should have minimal to no prior exposure to the Unity version of the game and they should be currently enrolled in the archaeology program.

1.2. Choosing participants

Invite archaeology students in the cafeteria and/or media room to test the game.

1.3. Set up

Laptop to play the game, tablet to take notes and phone for audio recording.

1.4. Materials

Materials needed to conduct the test:

- Laptop with the Unity prototype,
- Microphone to record the participants answers (Phone),
- Printed Consent forms and Questionnaires,
- Notebook to take notes on.

1.5. Unity survey questions

General information:

Name:

Age: 18-20; 21-25; 26+

Study year: First year; Second year; Third year; Fourth year or higher

Overall experience:

1. **How would you rate your overall experience with the game?**
   - Very Good
   - Good
   - Average
   - Bad
   - Very bad
2. **Follow-up: What aspects of the game did you like the most and the least?**
   - Text Answer
3. **Did you find the game easy to understand and play?**
   - Yes
   - Somewhat
   - No
4. **Follow-up: What aspects of the game were difficult to understand or play? What made them confusing?**
   - Text Answer
5. **Were the instructions in the game clear and helpful?**
   - Yes
   - Somewhat
   - No
6. **Follow-up: Which instructions were unclear or unhelpful? How do you think they could be improved?**
   - Text Answer

Educational content:

7. **Were there any concepts about archaeological fieldwork that you found interesting in the game?**
   - Text Answer
8. **Follow-up: Were there any concepts you wished were explained better or in more detail?**
   - Text Answer
9. **Did the game feel like a realistic simulation of archaeological fieldwork?**
   - Yes, it felt realistic
   - Somewhat, but there were areas that could be improved
   - No, it didn't feel connected to real-world practices
10. **Follow-up: Which aspects of the game felt unrealistic?**

11. **How useful did you find the game in learning about archaeological fieldwork?**
    - Very Useful
    - Somewhat Useful
    - Neutral
    - Somewhat not useful
    - Very not useful
12. **Follow-up: What aspects of the game contributed to your rating? Are there any specific improvements you suggest?**
    - Text Answer

Difficulty and immersion

13. **How immersed into the virtual world did you feel while playing the game?**
    - Completely immersed
    - Somewhat immersed
    - Not immersed at all
14. **Follow-up: What elements contributed to or detracted from your sense of immersion in the game?**
    - Text Answer
15. **What are your thoughts on the art style and visual design of the game?**
    - Liked it a lot
    - Liked it a bit
    - Neutral
    - Disliked it a bit
    - Disliked it a lot
16. **Follow-up: Were there any specific aspects of the art style or 3D models that stood out to you positively or negatively?**
    - Text Answer
17. **What do you think of the difficulty level of the game?**
    - Way too easy
    - A bit too easy
    - Just right
    - A bit too difficult
    - Way too difficult

These questions were approved by the client after implementation of his feedback.

Link to survey:
https://forms.office.com/Pages/DesignPageV2.aspx?origin=NeoPortalPage&subpage=design&id=DQSIkWdsW0yxEjajBLZtrQAAAAAAAAAAAZ__vSeMAlUNzRSTk5UVkVETEFGMVZOOUtJM1hSOVVITS4u&branchingelementid=r940b028b485c4920bfcf21841f210baa&analysis=false

2. Goals of the testing session

2.1. Objective

The objective of this testing session is to evaluate the usability, functionality, and visual appeal of the Unity.

2.1. Metrics

Usability and Gameplay: Gathering feedback on participants' satisfaction with the usability and design of the prototype.

a. Observation and audio recording:

- Observe testers while they navigate through the Unity prototype.
- Record the screen and interactions of testers to review it later.
- Track testers interactions during the prototype walkthrough, take notes of any points of hesitation or confusion.

b. Thinking aloud:

- Encourage testers to share their thoughts while navigating the prototype.
- Ask them to share their opinions on the usability, design and any issues they encounter.
- Take notes of what they say.

c. Post-Test questionnaire:

- Let testers answer all questions on a printed questionnaire, but give them the option to complete it on their phone later on, in case they have limited time.

3. Procedure

During each testing session, I will stick to the following script to ensure that all tests follow the same procedure, and the answers will be consistent and reliable.

1. Introduction (5-10 minutes):
    - Welcome testers to the place where the test will take place. Make sure that they feel comfortable so that they feel save with giving constructive feedback.
    - Once they are seated, give them the consent form to read through and sign. Explain that I will make a recording of the testing session if they are okay with it.
    - Explain the structure of the testing session and that they will be able to walk through the Unity prototype to play through the game, which is followed by a small questionnaire about their thoughts at the end.
2. Unity Testing (10 – 15 minutes):
    - Explain the purpose of the Unity testing phase and provide instructions for interacting with the prototype.
    - Initiate screen recording and encourage testers to provide feedback as they navigate through the game.
    - Remain available to assist testers if needed.
3. Questionnaire (5 minutes):
    - Conclude the Unity testing phase.
    - Inform testers that you made a survey with questions about their experience with the prototype.
    - Tell them that they can either fill it out now on paper or later on their phone by scanning the QR code.
4. Wrap-up (5 minutes):
    - Thank testers for their participation and valuable feedback.
    - Collect any additional comments or suggestions.

10.24. Third Test – Questionnaire

Name:

Age:

Study year:

☐ First year ☐ Second year ☐ Third year ☐ Fourth year or higher

Overall experience:

1. **How would you rate your overall experience with the game?**

☐ Very Good ☐ Good ☐ Average ☐ Bad ☐ Very Bad

2. **What parts of the game did you like the most and the least?**

Most	
Least	

3. **Did you find the game easy to understand and play?**

☐ Yes ☐ Somewhat ☐ No

4. **What part of the game were difficult to understand? What made them confusing?**

5. **Were the instructions in the game clear and helpful?**

☐ Yes ☐ Somewhat ☐ No

6. **Which instructions were unclear or unhelpful?**

7. **Were there any concepts about archaeological fieldwork that you found interesting in the game?**

8. **Were there any concepts you wished were explained better or in more detail?**

9. **Did the game feel like a realistic simulation of archaeological fieldwork?**

☐ Yes, it felt realistic ☐ Somewhat, but there were areas that could be improved ☐ No, it didn't feel connected to real-world practices

10. **Which parts of the game felt unrealistic?**

11. **How useful do you find the game in learning about archaeological fieldwork?**

☐ Very Useful ☐ Somewhat Useful ☐ Neutral ☐ Somewhat Useless ☐ Very Useless

12. **Follow-up: What aspects of the game contributed to your rating? Are there any specific improvements you suggest?**

13. **How immersed into the virtual world did you feel while playing the game?**

☐ Completely immersed ☐ Somewhat immersed ☐ Not immersed at all

14. **Follow-up: What elements contributed to or detracted from your sense of immersion in the game?**

15. **What are your thoughts on the art style and visual design of the game?**

☐ Liked it a lot ☐ Liked it a bit ☐ Neutral ☐ Disliked it a bit ☐ Disliked it a lot

16. **Follow-up: Were there any specific aspects of the art style or 3D models that stood out to you positively or negatively?**

17. **What do you think of the difficulty level of the game?**

☐ Way too easy ☐ A bit too easy ☐ Just right ☐ A bit too difficult ☐ Way too difficult

10.25. Third Test – Notes

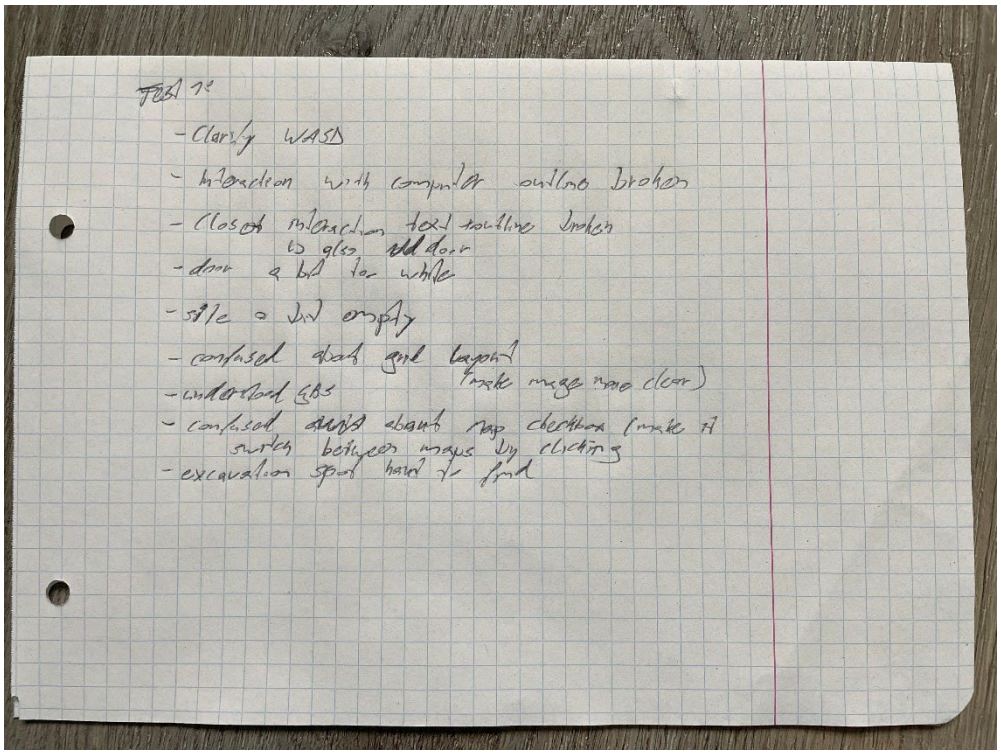


Figure 11: Test 3 notes - Tester 1

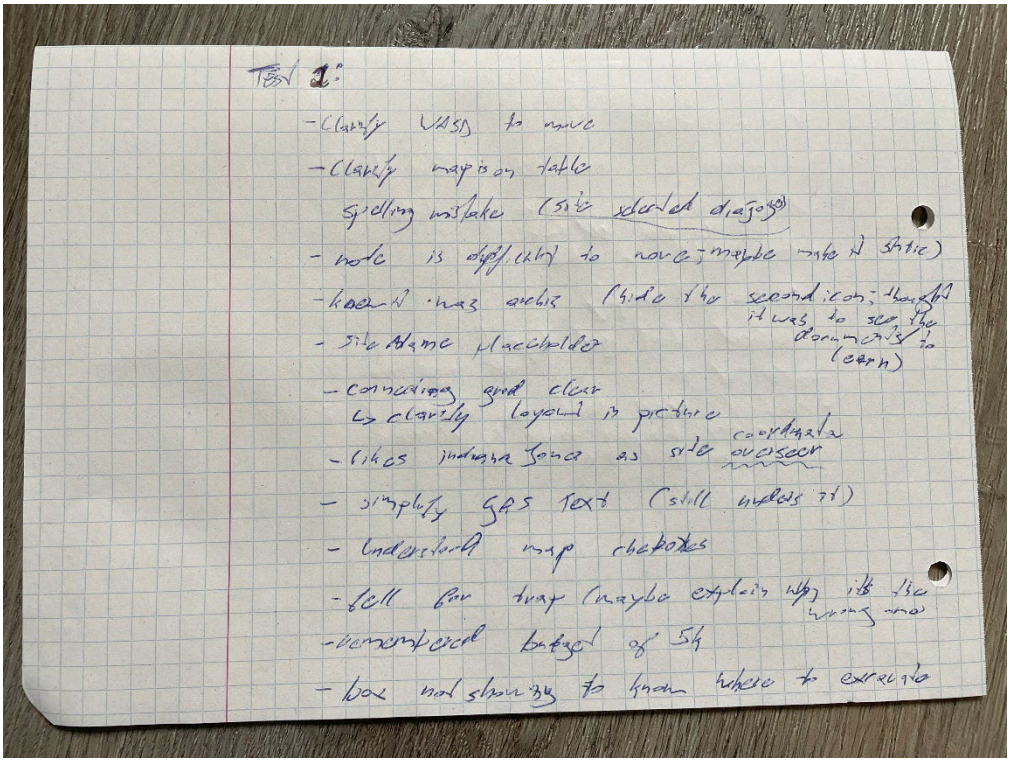


Figure 12: Test 3 notes - Tester 2

10.26. Third Test – Analysis

TODO add second test analysis

Third Test – Reflection

Testing reflection

What went well:

- *Approaching students in the canteen:* This method proved to be more successful than inviting them to Zernike, as attempted before, resulting in two successful tests. It also avoided bias of only students who are interested in video games to participate.
- *Questionnaire:* The questionnaire proved to be very helpful in gathering consistent feedback. Keeping it compact to two pages and including a lot of multiple-choice questions prevented overwhelming the participants and draining their energy.
- *Useful feedback:* Valuable insights were gained regarding usability and difficulty, and minor iterations will be drawn from the tests. The art style and immersion were also tested successfully positive feedback was taken.
- *Notetaking:* Using a paper block for notetaking proved to be more efficient than using a tablet, like in the first evaluation. This method ensured that all feedback and observations were accurately recorded in detail.
- *Consent forms:* Providing printed consent forms made the signing process a lot faster and easier than having participants sign them on a tablet.

What to improve upon next time (Rigorous evaluation):

- *Approach method:* Approaching students in the canteen resulted in long waiting times for them to appear, even after looking at their schedule with the client and sending out email invitations. For the rigorous evaluation, I will ask the client/secretary to send out an invitation to all first-year students, where they can sign up to the tests by clicking on a link to Meetergo, where they only had to select a time and date, and enter their name and email.
- *Online tests:* Testing online via Microsoft Teams would allow for greater reach, as some participants expressed a preference for this option in a previously conducted survey. Additionally, this would enable testing the game on students' computers with various screen resolutions and hardware specifications.
- *Screen recordings:* Implementing screen recording during will facilitate more in-depth analysis after the test. It would also provide the ability to closely examine why bugs or technical issues occur on students' devices.

Advantages and Disadvantages of Target Audience testing:

It was very important and useful to test with archaeology students to see how the target audience reacts to the game and what their thoughts are. This allowed for a better understanding of usability and difficulty of the game, especially considering that not all of them palay video games. There were, however, some challenges in approaching the target audience for testing. Students did not respond to emails that were sent out to invite them to testing sessions, and some of the students were hesitant to play the game when being approached in the canteen. It is also important to acknowledge that, having been diagnosed with social anxiety, my own difficulties of approaching people in public could have contributed to these difficulties.

Overall Reflection:

All in all, the testing session was still a success, as I was finally able to test with archaeology students and gained valuable insights into how they perceive the game. I will, however, change how I invite students to and conduct tests for my rigorous evaluation and also implement screen recordings, like in a previous evaluation.

Expert evaluation notes

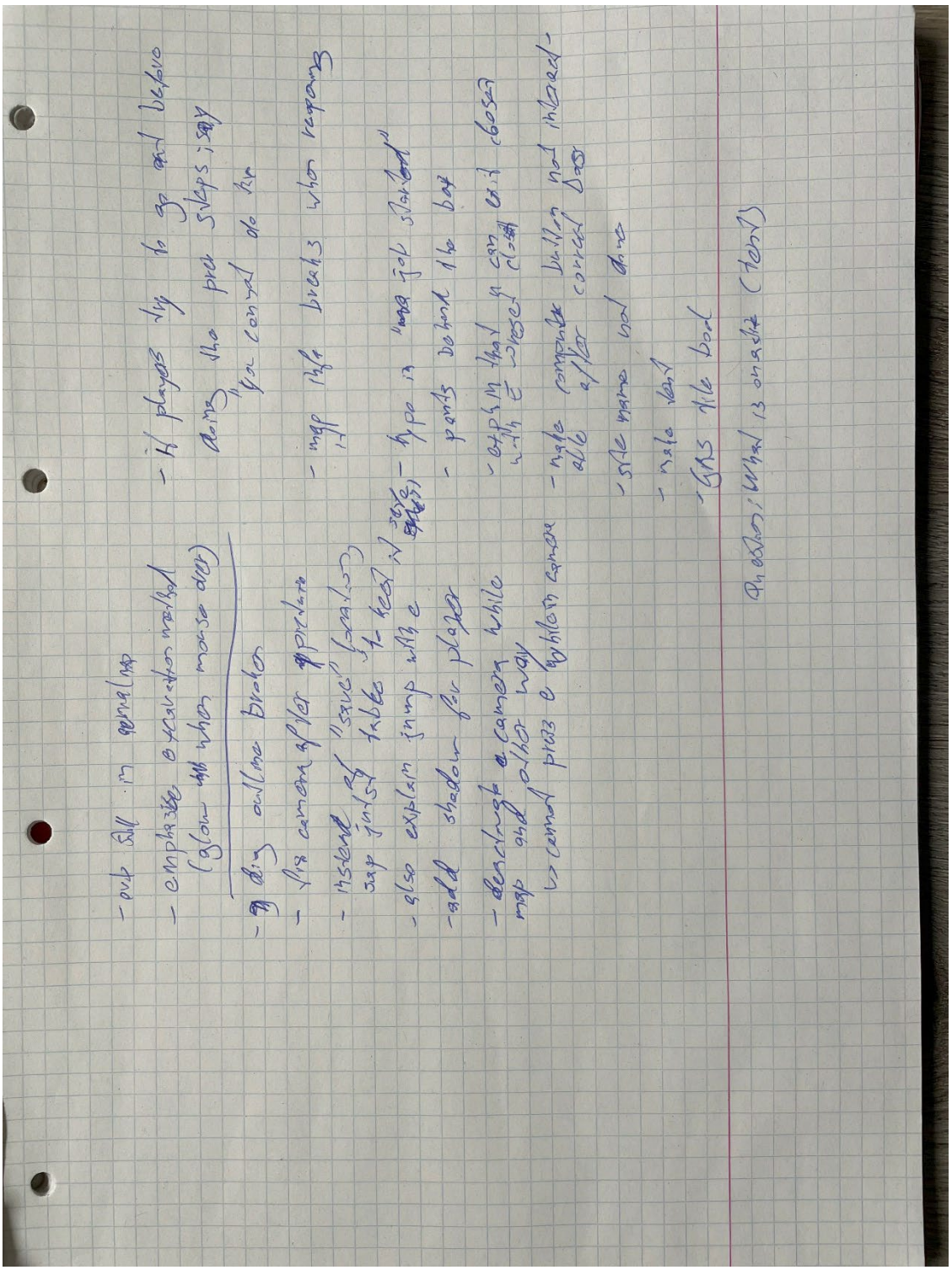


Figure 13: Expert evaluation notes

Rigorous test plan, etc.

2 group study questions, etc.

Rigorous Evaluation – Assessments

The assessment is based on real archaeology exams provided by the client, and adjusted to match the contents of the game at the time of the evaluation. The highlighted text shows the correct answers.

Name:

Date:

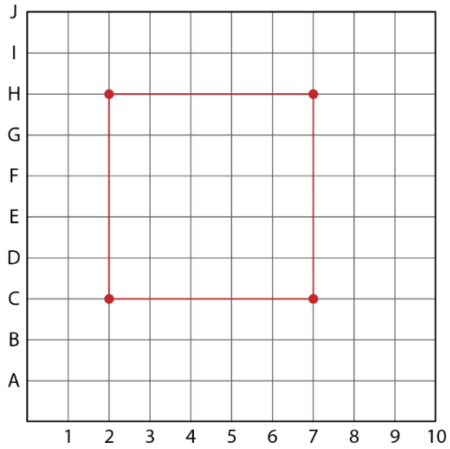
Good Luck

Preparation:

1. What documents need to be submitted to inform the municipality/ministry about an excavation? (Select all that apply) /2
   - ☐ Plan of Action (PvA)
   - ☐ Environmental impact assessment (MeT)
   - ☐ OZM-Number
   - ☐ Programme of Demands (PvE)
2. Why is it important to wear safety gear during an excavation? (Select the one that makes the most sense) /2
   - ☐ To look professional
   - ☐ To avoid accidents and injuries
   - ☐ To keep warm
   - ☐ To protect against sunburn

On Site:

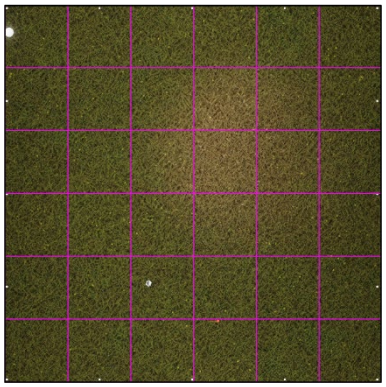
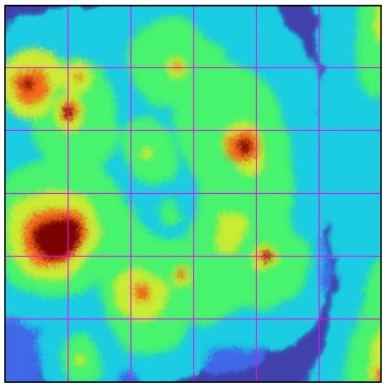
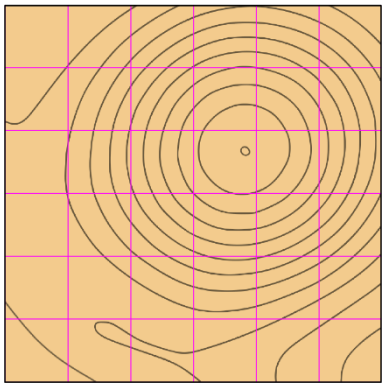
3. What on-site safety measures should be taken before starting an excavation? (Select all that apply) /2
   - ☐ Placing safety flags around hazards
   - ☐ Cleaning up debris from the excavation area
   - ☐ Checking nearby trees for stability
   - ☐ Ensuring proper ventilation in nearby buildings
4. The image below shows a 5x5 meter excavation area (highlighted in red) within a field. Draw how a 1-meter grid is supposed to be properly set up: /3



5. What is the purpose of ground radar scanning? (Select all that apply) /2

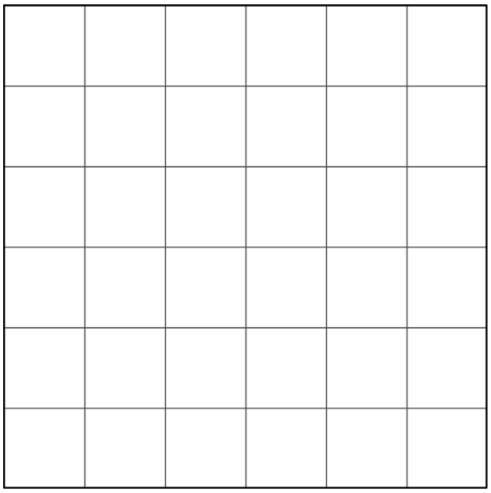
- ☐ To identify underground water sources
- ☐ To create a topological map of the area
- ☐ To assess the quality of the soil
- ☐ To locate buried artifacts

6. The images below show an aerial photograph, a topographic map, and a ground radar scan of an excavation site. Please label each image correctly in the fields below. /3

		
Aerial photograph	Ground radar scan	Topographic map

7. Based on the maps above, in which tile of this site would you excavate. Justify your choice in the field on the left. /2

Because of the elevated spot in the field and the corresponding scan result in the GRS
The aerial photograph shows that this spot is less green due to being further away from the ground water



8. How do you correctly conduct a 1x1 meter excavation? (Select all that apply)

/2

- ☐ By using plywood sheets for shoring
- ☐ By using a ground-penetrating radar
- ☐ By digging in layers with shovels
- ☐ By using an excavator to remove large portions of soil

9. What steps do you take when you find an artifact in the ground? (Select all that apply)

/2

- ☐ Conduct a chemical test on the artifact
- ☐ Take a picture of the artifact
- ☐ Immediately contact a museum to sell the artefact
- ☐ Cover the artifact with soil to keep its condition

Grade:

1 (19-20)	2 (16-18)	3 (13-15)	4 (10-12)	5 (0-9)

Meeting Summaries

Meeting summaries

First meeting 08.02.2024

- Discussed roadmap.
- Iterated and added questions for the survey.
- Planned surveys and testing sessions.
- Include question in the survey to ask if they want to participate in testing sessions and future surveys.
- Send survey to university to send them to students.

Second meeting 28.02.2024

- Updated client on progress (see PowerPoint for specifics).
- Iterated concept to make it more accurate to real world fieldwork.
- Discussed testing session and facilitation (room booking, etc.).
- Discussed general assignment to make sure I am doing enough to get a good grade.

Third meeting 20.03.2024

- Updated client on progress and discussed continuation of the project
- Discussed ideas about the game (progress tracker, making sure the difficulty matches to students with different knowledge, etc.)
- Discussed and clarified feedback about concept stages, a summary of the email can be found here (Feedback on Version 1)

Fourth meeting 03.04.2024

- Discussed testing in detail and where to test (Cafeteria, GIS lab and project room)
    - More students will be there from April 15th (after exam phase)
- Discussed and clarified client feedback on the concept stages, a summary of the email can be found here (Feedback on Version 2):
    - Where safety flags can be placed:
        - Lime and bones (indicate burial), mortal shells
    - Possible place for the excavation: Urnfield; Vases are often crushed
    - Clothing recommendations: cargo pants advised, shorts advised against.
    - Conduct resistivity survey after grid setup.
    - Correct typo in aerial photography.
    - Adjust budget for excavation methods:
        - Hole: €5,000

        - Strip: €15,000
        - Excavator: €150,000
- Showed the prototype and client gave feedback (computer background is confusing, etc.)
    - Adjust computer background to be less confusing.
    - Use ropes instead of spray paint for making grids.
    - Make the site appear as grass instead of sand, with artifacts located where the map is elevated.
    - Adjust grass prominence according to elevation.

Fifth meeting 17.04.2024

- Clarified goals of the project:
    - Played by first year students in block 4, where they have a fieldwork course
    - Would be used as a tool for homework so students can prepare for classes
- Discussed student schedule to see when most students are in the canteen:
    - Friday 19th and 26th 12:00-13:00 first year
- Discussed post-test questionnaire
    - Print it out so that students can fill it out immediately
    - Make it maximum 2 a4 pages
- Showed updates on the Unity prototype, which led to the following **iterations**:
    - For clean-up dialogue, instead of "garbage", say "objects that could interfere with the excavation"
    - Grid explanation: image is on the left, dialogue says on the right
    - In Archis, instead of colouring book use Munsell Soil colour charts/Munsell Book
    - Make the grid 4x4 instead of 5x5 to avoid repetition on grid setting and ground radar scanning to keep up student motivation
    - Red spot on the GRS-result is too obvious -> make it a decoy and hide the artifact under a smaller dot; this way players have to use the other maps to make a decision
    - Site description shows NL, dot is in Australia
    - Maybe add "cheat codes" to be able to jump between stages in the game for testing
- Discussed expert evaluation for the next meeting

Sixth meeting 26.04.2024

- Discussed pre-test/post-test assessment
    - Client sent example exams for reference
- Discussed rigorous evaluation
    - Client will forward my email to first year students
- Showed the Unity prototype and discussed the following **iterations:**
    - Show the next site location on the map as a teaser -> contributes to excitement of continuing the game
    - Add a low resolution preview of the GRS results on the device (adds fun and might steer them into scanning the area in a pattern instead of randomly)
    - Excavation method preview images look very similar; make them more distinct, by:
        - Making the trench excavation longer
        - Showing the site from a aerial view angle
        - Place an excavator/digger next to it for size reference
    - When taking a photograph of the artifact, include:
        - A measuring stick for scale reference
        - A sign with a small description of the artifact
        - Sometimes a north arrow is included as well, but not a must
    - For taking a picture of the artifact on the table, place it on a grid paper with a measuring stick and the artifact label

Seventh meeting: 01.05.2024

3D art:

3D models created in blender and textured in Substance Painter by me.

Office models in Blender:

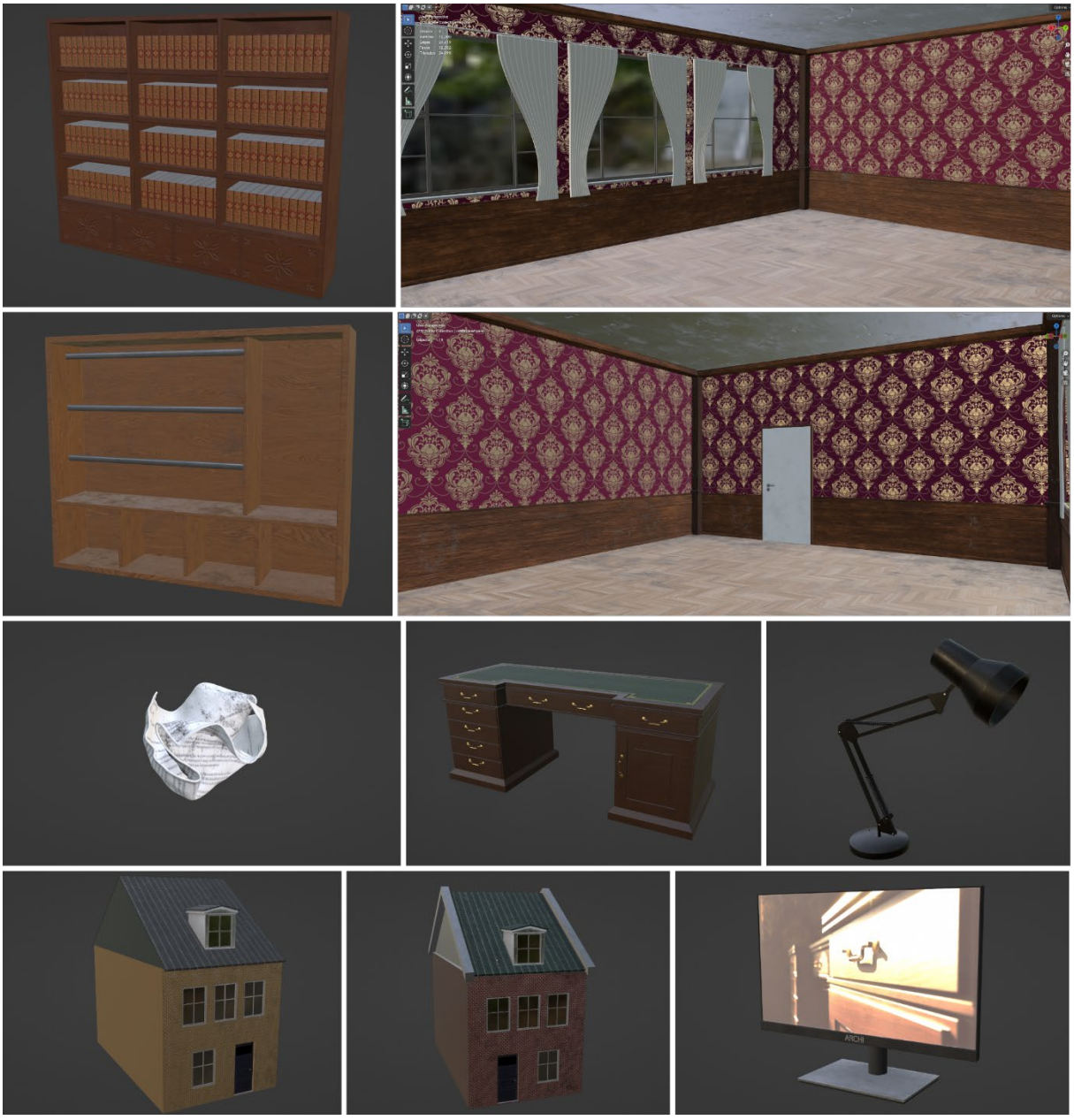


Figure 14: 3D models in Blender - Office

On-site models in Blender:

Figure 15: 3D models in Blender - On-Site

Office models in Unity:

On-site models in Unity:

11. Appendix

11.1. Asset list

Images, textures, and sound effects that were not made by me and used in the prototype:

- Adobe XD world map placeholder: https://www.freepik.com/free-vector/illustration-global-icon_2687446.htm#query=world%20map&position=0&from_view=keyword&track=ais&uuid=23440276-de08-4972-b0d3-5c9dd9306828
- Book pattern elements: https://www.freepik.com/free-vector/vector-line-vintage-scroll-items-ornate-design_13381300.htm#fromView=search&page=1&position=7&uuid=4d0f8f9f-aad5-4b9a-9f19-79e020a0653e%22%3EImage
- Concept Art Computer wallpaper: https://pixabay.com/users/8385-8385/?utm_source=link-attribution&utm_medium=referral&utm_campaign=image&utm_content=55067%22%3E8385
- Concept Art/Adobe XD Desktop icon placeholder: https://icons8.com/icon/3mZCmvlo0TiW/note%22%3ENotiz
- Concept Art/Adobe XD landlord agreement form background placeholder: https://www.freepik.com/free-vector/cartoon-jungle-background_14351507.htm#fromView=search&page=1&position=1&uuid=c891ce85-2898-4dae-afd8-82b6577121a7%22%3EImage
- Concept Art/Adobe XD Plan of Action background placeholder: https://www.freepik.com/free-vector/gradient-spring-landscape-concept_6880829.htm#fromView=search&page=1&position=3&uuid=0568096e-ddf3-4605-b48a-451dc59f1c9e%22%3EImage
- Concept Art World map (placeholder): https://www.komar.de/vintage-world-map.html#/
- Footsteps: https://commons.wikimedia.org/wiki/File:Footsteps_icon4.svg
- HDRI Sky – On site: https://polyhaven.com/a/autumn_field_puresky
- HDRI Sky – Office: https://polyhaven.com/a/resting_place
- Indiana Jones 3D model: https://sketchfab.com/3d-models/indiana-jones-21d9bc39d1ce4b598a4ebdd9b90a878b
- Paper texture - normal map: https://patternpanda.org/paper.html
- Site overview paper texture: https://unsplash.com/de/@joaovtrduarte?utm_content=creditCopyText&utm_medium=referral&utm_source=unsplash%22%3EJo%C3%A3o
- Texture – Dirt: https://freepbr.com/materials/sandy-dry-soil-pbr-material/
- Texture – Grass: https://freepbr.com/materials/wispy-grass-meadow/
- Texture – Office Floor: https://freepbr.com/materials/hungarian-point-flooring-pbr/
- Texture – Office Wall: https://www.freepik.com/free-vector/vector-damask-seamless-pattern-background-classical-luxury-old-fashioned-damask-ornament-royal-victorian-seamless-texture-wallpapers-textile-wrapping-exquisite-floral-baroque-template_1283589.htm#query=carpet%20pattern&position=36&from_view=keyword&track=ais&uuid=34726391-66d6-47ce-8771-78a9794963e0
- Texture – Sand (in old size): https://freepbr.com/materials/wavy-sand/
- User persona Picture: https://www.pexels.com/de-de/foto/frau-die-roten-buchbinder-halt-3762803/

11.2. Survey Answers – Raw Data:

11.3. Expert interview transcript (English Translation)

18. March 2024, 03:04PM

19 Min. 3 Sec.

Hofbauer K, Kevin 1:04
Okay, first question: What was your experience with ETS2 like? Were there any parts that were particularly realistic?

Paul, Simon 1:13
Yes, realistic, okay, yeah. Wait, uhm.

Paul, Simon 1:38
Yes, I think realistic. Yes, I think precisely the traffic lights and such, for example, when turning left, there's this oncoming traffic all the time, so the oncoming traffic keeps going, and that was quite realistic because the opposite side also has a green light, and you have to wait before you can turn left.
That was cool or even at roundabouts, um, that, um, they wait, so when you're in the roundabout, the people entering the roundabout wait for you, so normal right-of-way rules like that were quite realistic. Otherwise, yeah, driving trucks, well, I've never driven a truck in my life, so I can't say much about that, but you could also drive with an addon car, and that, well, in terms of lane changing and such, was quite, quite realistic because, yes, theoretically I played ETS 2 even before getting my driver's license, and, yeah, precisely, so I could confirm, in a way, that the experience I had in ETS was, in a way, confirmed in the real world, that it was realistic.

Hofbauer K, Kevin 3:08
Okay, then. In your opinion, what are the strengths of the game when it comes to simulating real scenarios in the game? What does the game do very well?

Paul, Simon 3:34
Mhm.
Very well.

Hofbauer K, Kevin 3:44
What do you like in the game?

Paul, Simon 3:46
The, the driving, so the driving experience with all the sounds makes it quite realistic.

Hofbauer K, Kevin 3:58
Mhm.

Paul, Simon 4:01
And also, the surroundings that I quickly change, it's also very, very well done and.
And also the different conditions, like driving during the day or at night, and that's quite realistic, that you don't see as much at night, that's also, yes, so.
That's well done.

Hofbauer K, Kevin 4:28
Okay. Then, what are the weaknesses of the game compared to real life, what's not so realistic or could be better?

Paul, Simon 4:41
Mhm.
Exactly, like for example, in some traffic situations, how the AI reacts.
For example, when, uh, when I have the turn signal on, that it just stops behind. Usually in real traffic, even if you signal and the car behind is on the left lane.

Hofbauer K, Kevin 5:03
Yes.

Paul, Simon 5:12
Usually, it still goes on and I wait for the traffic, but in ETS sometimes the cars just stop and let me go by driving away. I don't think that really happens in the real world, that there's a car on the left lane letting you merge.

Hofbauer K, Kevin 5:34
Yep.
Okay. Then, how is the comparison between ETS2 and driving in real life? What's the comparison for you? Are there any major differences that stood out?

Paul, Simon 5:58
Mhm well, if you're driving without traffic, it's pretty much the same, just yeah, you have a different feeling when you're in the car because then you really play it more, so with ETS you don't feel it, that you're in the car, you don't feel the vibrations and such when you're, I don't know, going 130, in terms of noise, it's pretty much the same, and also in terms of visuals, like the scenery, the lighting, landscapes, it's quite realistic, even how the roads look, it fits. Yes, exactly, and otherwise, differences, do you need more differences?

Hofbauer K, Kevin 6:50
If any come to mind?

Paul, Simon 7:01
Yes, okay, for example at high speeds, you don't always feel that in ETS, that you're, I don't know, going 130, but in real life, oh yeah, you feel the 130.

Hofbauer K, Kevin 7:07
Okay.
Then, did the game enhance your... your understanding of driving, so did it help?

Paul, Simon 7:44
Yes, yes definitely. So for me, it was like when I was on my first driving lesson It helped me a lot, for example, to estimate distances better. For example, in terms of lane keeping or checking the mirrors, it was easier. It wasn't something entirely new, for example, not to look at the road for a second, but instead to look to the right in the mirror for a moment.

Hofbauer K, Kevin 8:16
Yes.
Any features or functions in the game that particularly helped in comparison to driving a car?
For example,

Paul, Simon 8:41
Yes, for example in ETS, when you complete a job, you have to park the cargo at a certain spot, and in the game, I practiced parking already, so, estimating distances, seeing how to steer, and such.
It helped quite a bit.

Hofbauer K, Kevin 9:09
Okay.
Got it, then.
How did the game handle external factors, for example, weather or other traffic situations?

Paul, Simon 9:34
Mhm.
Well, exactly the weather, so the weather did change. That was also more realistic. You didn't drive in sunshine all the time, but it rained and in the winter months, well, the real winter months, it also snowed, I think, right? Yeah, and so in terms of snow, I think there wasn't much difference whether it snowed or rained in the game. Which doesn't correspond to reality, where it does make a difference whether it's just raining or snowing.
Yes, so that you might skid or slide, you didn't really feel that in the game.

Hofbauer K, Kevin 10:23
Okay.
Did you encounter any, um, were there any difficulties that made the game less realistic or less fun.

Paul, Simon 10:42
Mhm.
Yes, initially, yes, exactly initially, when I only played with a keyboard, it was still rather unrealistic. But later, when I had a steering wheel and also with force feedback, so you could feel something, it helped a bit, but yeah, it's not entirely realistic because you still lack the complete haptics. You're still at home somehow and just pressing buttons, which isn't the case with a truck, for example, if you honk or something, or quite, quite simply, if you crash, nothing happens to you.

Hofbauer K, Kevin 11:37
Okay.
Based on your experience eith ETS2 and in real life, what would you recommend...

Paul, Simon 11:56
Mhm.

Hofbauer K, Kevin 11:59
To make the game more realistic? Or no wait, what would you recommend generally to make games more realistic?

Paul, Simon 12:11
Exactly um, yes, maybe better AI, so that maybe the AI cars react better to situations, so more realistically, um, more realistic reactions. Otherwise, just that the weather conditions, so snow, also have an impact on the driving feel, on the driving itself, because, it's clear, when it's snowing, then, I don't know, your braking distance almost doubles, or something, you didn't really feel that in the game.
Mhm what else?
Yes, otherwise, it's fine.

Hofbauer K, Kevin 13:19
Okay, so mainly AI and weather should be more realistic.

Paul, Simon 13:23
Mhm.
Exactly, yes.

Hofbauer K, Kevin 13:27
Okay, and then, any moment or scenario that stands out in your mind as particularly realistic or immersive for you? Where you really thought you were really driving a truck, or car.

Paul, Simon 13:50
Yes, yes, when I was stuck in traffic.
But I have to say, that was in online mode, it was somehow, when you drove a certain route there was always traffic.

Hofbauer K, Kevin 14:04
Calais - Duisburg.

Paul, Simon 14:05
Exactly, exactly, exactly there, France Germany, there was always traffic, it was, it wasn't a highway, it was a country road, I think, and there was always traffic jams, I think that was, that was quite so, well if you ask a truck driver, that's I think the most realistic thing you can experience there.

Hofbauer K, Kevin 14:28
Okay.
Then, how did you feel driving in virtual Europe. Well,

Paul, Simon 14:43
Mhm yeah, so.

Hofbauer K, Kevin 14:45
So, were there any feelings or sensations that you also felt in reality?

Paul, Simon 14:55
Yes, for example, when you were driving around in France, you really noticed, you really noticed, you were in France, you looked at the small villages.
That was pretty, you really felt like in France, or also in Italy for example, so you really felt this flair. And, I don't know, France I've never been myself, but I've seen a lot of pictures. But for example Italy, so the whole scenery was already very, very good, and so you almost felt like you were there, yeah.

Hofbauer K, Kevin 15:30
So the graphics...

Paul, Simon 15:32
Exactly, yes.

Hofbauer K, Kevin 15:33
Okay. Do you think that the models themselves, the 3D models, helped?

Paul, Simon 15:46
The 3D models of what? Of the scenarios?

Hofbauer K, Kevin 15:48
So in the game, the houses and such.

Paul, Simon 15:52
Yes yes, Oh yes.

Hofbauer K, Kevin 15:53
Okay.

Paul, Simon 15:56
And for example, it was quite interesting when you were driving around in Vienna itself, then you really saw a lot, I think, but that was probably with the DLC, that you could see a lot more in Vienna..

Hofbauer K, Kevin 16:11
Mhm.

Paul, Simon 16:13
I think that's not so much in the core of the game, but...

Hofbauer K, Kevin 16:17
Ja.

Paul, Simon 16:18
Basically with the expansions, yep.

Hofbauer K, Kevin 16:25
Okay.
Do you think, so from your experience, that simulators, like ETS2, have more value than just for entertainment, also like, that they're also for learning-

Paul, Simon 16:42
Yes.
Yes, quite quite..

Hofbauer K, Kevin 16:48
Okay.
And do you think that applies not only to ETS2, but generally to games?

Paul, Simon 16:55
Yes, definitely definitely, because that um.
For learning, it's a much better environment, where you are, you're just at home, you're just, you're not immediately thrown into the real situation, but you can practice small things virtually already, without anything happening to you.

Hofbauer K, Kevin 17:31
Okay, last question, if you have anything else to add or last word, or?

Paul, Simon 17:38
Mhm.
Yes, what I would like to say is that, so when playing ETS, you noticed, so we played like this for 2-3 hours straight, like for example, also how fatigue and concentration can affect the driving style, so like after 2-3 hours of ETS, I was already a bit tired of course and naturally my concentration also decreased and then I was more prone to accidents, which also showed or showed in real life, that naturally on longer trips you should also take breaks. That, I wanted to say.

Hofbauer K, Kevin 18:27
Okay, then we covered all the questions. Thank you for the interview.

Paul, Simon 18:51
You're welcome, no problem.