Developing Narrative Design in Role-Playing Games with Natural Language Interaction for Non-Player Characters



Luke Haslett

Supervisor: Prof. Esther MacCallum-Stewart

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Abstract

This thesis investigates how natural language interaction (NLI) systems can support narrative design in role-playing games (RPGs), with a focus on player experiences of non-player character (NPC) interaction. While dialogue systems in games commonly rely on pre-scripted responses and predetermined dialogue options, contemporary natural language technologies provide opportunities for players to communicate with NPCs using free-form written or spoken input. This research examines how such interaction influences player perceptions of enjoyment, conversational freedom, narrative agency, realism, immersion, intuitiveness, and engagement.

The study was guided by four research questions and adopted a mixed-methods approach comprising a literature review, pilot study, prototype development, and main experimental evaluation. An original RPG prototype, *Turing*, was developed using Unreal Engine 4.27 and integrated OpenAI's GPT-4 for generated NPC dialogue alongside Google Cloud Speech-to-Text and Text-to-Speech services. Twenty-two participants interacted with the prototype during controlled playtesting sessions before completing a post-play questionnaire. Structured responses were analysed using frequencies and percentages alongside selected exact inferential tests, while open-text responses were examined using reflexive thematic analysis.

The findings indicate generally positive participant responses to NLI-driven NPC interaction. Conversational interaction was associated with enjoyment, exploration, worldbuilding, characterisation, narrative discovery, personal expression, and immersion. Participants also evaluated NPC realism and naturalness positively, although these perceptions were influenced by contextual knowledge, situational awareness, game-state responsiveness, and consistency with the characters' narrative roles. The findings further distinguish conversational freedom from wider narrative agency, where participants more consistently perceived freedom in how they could communicate than control over the broader narrative. Response delays, repetitive or lengthy dialogue, limited contextual knowledge, and interaction friction also demonstrated limitations in the implemented system.

The thesis contributes theoretical, methodological, empirical, and practical knowledge concerning the integration and evaluation of NLI within narrative RPG design. It provides participant evidence concerning free-form NLI in a playable RPG, documents an approach for designing and evaluating NLI-enabled NPC interaction,

and identifies design considerations relating to conversational freedom, contextual control, NPC knowledge, responsiveness, and narrative coherence. Rather than positioning NLI as a replacement for established dialogue systems, the findings suggest that its value depends on how conversational interaction is integrated with the wider narrative, gameplay, and interface structures of a game.

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Chapter 01: Introduction

1.1 Background and Rationale

The role-playing game (RPG) genre has long been associated with narrative depth, immersive worlds, and player agency, making it ideal grounds for investigating interactive storytelling. Central to many RPG experiences is the role of non-player characters (NPCs), which serve to provide narrative information, respond to player actions, and support progression through a game world. However, approaches to NPC design have traditionally relied on pre-scripted dialogue and limited response systems, resulting in interactions that can feel rigid, repetitive, and disconnected from the dynamic nature of player agency. While these approaches allow designers to maintain control over narrative content, they can also limit how players communicate with characters and make the boundaries of interaction more noticeable.

This research investigates how natural language interaction (NLI) systems can be incorporated into RPG narrative design to provide greater flexibility in player-NPC communication, with the goal of exploring how NPCs can operate as more adaptive and responsive narrative agents while allowing greater player contribution to conversation. Advancements in natural language processing (NLP), particularly large language models (LLMs), provide new possibilities for interpreting player input and generating responses during play via real-time dialogue systems. Therefore, this study sits at the intersection of narrative game design, NLI, and human-computer interaction (HCI), examining both the narrative and interaction design considerations that arise when these technologies are applied to NPC dialogue.

To approach this problem, a practice-based solution was implemented through the design and evaluation of a prototype RPG called *Turing*. The prototype was designed to support more flexible and responsive narrative interaction by enabling players to communicate with NPCs through written or spoken natural language. Turing is built with modern NLP tools, including OpenAI's GPT-4 for generative NPC dialogue, while Google's Text-to-Speech and Speech-to-Text systems support real-time interaction. Together, these systems provide a means of testing how NPCs could respond dynamically to player input while remaining connected to the characters, gameplay tasks, and evolving narrative contexts designed for the game.

Through the development and evaluation of Turing, this research examines the limitations and potential of NLI as part of future narrative game design. In particular, it considers how players respond to greater conversational freedom and how this influences their perceptions of NPC interaction, narrative agency, realism, immersion, and engagement.

1.2 Research Questions

Building on the challenges and opportunities identified in the literature review (see Chapter 02), and through the development and evaluation of *Turing*, the research addresses four questions. These questions address the intersection of narrative design, RPGs, and NLI, and are concerned with player experience, player-NPC interactions, and the capabilities of modern NLI systems:

1. **How do players perceive and engage with an NLI-driven RPG, and what factors influence their enjoyment, interest, and willingness to recommend such a design?**
   This question examines the broader reception of NLI technology in RPGs and the factors that contribute to positive or negative player experiences. Particular attention is given to narrative coherence, NPC behaviour, player agency, enjoyment, and the participants' willingness to endorse and recommend similar designs.

2. **How do NPC interactions driven by natural language systems influence player perceptions of narrative agency, realism, and freedom in role-playing games?**
   This question focuses more specifically on NPC interaction. It explores whether allowing players to communicate through NLI-enabled dialogue systems influences their observations of control and agency, as well as their sense of realism and involvement in the narrative.

3. **How do players evaluate the effectiveness and realism of NLI systems in video game environments, particularly in comparison to virtual assistants and other NLI-integrated games?**
   This question considers the previous experiences that players have with NLI systems. Familiarity with virtual assistants such as Alexa and Siri, alongside experience of existing implementations of natural language in games, provides contextual information for interpreting participant expectations.

Where participants make direct comparisons, these responses provide further insight into how *Turing* is evaluated in relation to other conversational systems.

4. **How does the use of NLI systems, supported by written or spoken input, influence player immersion, intuitiveness, and observations of innovation in video game design?**
   The final question explores the broader player experience of using NLI as an interaction method. This includes the written and spoken input methods available in the prototype and considers how participants perceive their immersion, intuitiveness, and practical usability. It also considers whether participants perceive the interaction approach as opening new possibilities for video game design.

Together, these questions address gaps identified through the literature review concerning the use of contemporary NLI technologies within RPGs. Existing research demonstrates established interest in emergent narrative, NPC interaction, and earlier natural language systems, but much of the existing literature focuses on static narrative design, pre-scripted NPC interactions, or more restricted forms of natural-language input. There is therefore limited understanding of how contemporary NLI systems influence player experience when integrated directly into an RPG. Furthermore, while virtual assistants and other commercial applications of NLP have been studied extensively, the use of contemporary NLI within game-based NPC interaction remains comparatively underexplored.

Another gap lies in the evaluation of player perceptions regarding the realism, agency, freedom, and intuitiveness of NLI-enabled interactions. Although generative artificial intelligence (AI) and NLP technologies have gained considerable attention in recent years, their relationship with player immersion and narrative agency in games requires further investigation. By addressing these questions, this research examines how greater conversational freedom affects player-NPC interaction and the extent to which it can contribute to narrative experiences within an RPG.

Overall, this study contributes to both academic discourse and industry practices by offering new insights into the design, implementation, and reception of NLI systems in video games. It provides a basis for evaluating how participants experience these

systems and how their responses relate to existing research in narrative game design, NLI, and HCI.

1.3 Aims and Objectives

The primary aim of this research is to investigate how NLI systems can support narrative design in RPGs, with a focus on player experience, immersion, and the extent to which conversational interaction can contribute to dynamic and adaptive narrative experiences. Addressing the limitations of traditional NPC design, this investigation evaluates whether contemporary NLI can support NPCs as more responsive narrative agents within authored game structures.

The research was guided by five objectives:

1. **Explore player perceptions of NLI-driven RPGs**
   The study examines how players engage with and perceive an RPG that incorporates modern NLI systems, including the factors that influence enjoyment, narrative immersion, and a willingness to recommend similar experiences.

2. **Evaluate the impact of NLI-enabled NPC interactions**
   The research assesses how interactions with modern NLI-enabled NPCs influence participant perceptions of narrative agency, realism, and conversational freedom. This provides a basis for considering how more flexible dialogue systems can support narrative engagement.

3. **Compare NLI systems in games with other applications**
   Participant experiences with NLI in gaming are considered alongside their previous experiences with virtual assistants and other NLI-based platforms. This provides contextual information for understanding the expectations that participants bring for natural language systems in games.

4. **Design and develop a prototype game**
   A prototype RPG called *Turing* was designed and developed to incorporate contemporary NLI systems and provide conversational interaction with NPCs through both written and spoken input. The prototype serves as the research artefact through which the research questions are investigated and participant data is collected.

5. **Analyse the role of NLI in player immersion and perceptions of innovation**
   The study examines how NLI influences participant perceptions of immersion and intuitiveness during gameplay. It also considers whether participants perceive the interaction method as offering new possibilities for narrative engagement and video game interaction.

These objectives were addressed through a mixed-methods research approach consisting of five main stages:

1. **Literature Review**
   Existing literature concerning narrative design, NLI systems, and HCI in gaming was reviewed to establish the theoretical context of the investigation and identify challenges and opportunities requiring further study.

2. **Pilot Study**
   An exploratory pilot study gathered preliminary information about player experiences and expectations concerning narrative design, NLI, and HCI in games. The findings were used to inform the subsequent methodology and development of the experimental prototype.

3. **Prototype Development**
   An RPG prototype, *Turing*, was developed in Unreal Engine and integrated OpenAI's GPT-4 for generative dialogue alongside Google Cloud's Text-to-Speech and Speech-to-Text services, and advanced plugin tools for conversational interaction. These systems formed the basis of the natural language interactions evaluated during the gameplay experiment.

4. **Experiment and Data Collection**
   Participants played the Turing prototype within a controlled testing environment, completing gameplay tasks and interacting with NLI-enabled NPCs. Quantitative and qualitative data were then collected through a post-play questionnaire and direct observation.

5. **Analysis and Evaluation**
   The collected data was analysed in relation to the research questions and objectives. Participant responses were used to examine how the implemented

NLI systems affected their experiences of NPC interaction, narrative design, and gameplay.

This combination of literature, exploratory research, prototype development, and participant evaluation provides the methodological basis for investigating NLI within RPG narrative design.

1.4 Research Contribution

This thesis makes four related contributions to knowledge across theoretical, methodological, empirical, and practical areas of narrative game design, NLI, and HCI. These contributions develop across the thesis rather than emerging from a single stage of the research. The literature review in Chapter 2 establishes the theoretical and design problems that motivate the investigation, while the pilot study in Chapter 3 provides preliminary evidence concerning player expectations of NPC interaction and NLI. Chapters 4 and 5 translate these findings into the evaluation methodology and design of the *Turing* prototype. The resulting participant evidence is presented in Chapter 6 and interpreted in relation to the existing research in Chapter 7.

Theoretical Contribution

Theoretically, the research contributes to further understanding the relationship between NLI, NPC design, and player-driven narrative in RPGs. Chapter 2 identifies existing work concerning emergent narrative, NPC believability, player agency, and natural language interaction, while also establishing limitations associated with restricted or pre-scripted forms of player-NPC communication. The pilot study in Chapter 3 reinforces the relevance of this problem, particularly through participant responses identifying NPCs as important narrative agents and existing dialogue as potentially scripted or lacking depth.

These findings drive the investigation of whether contemporary NLI can support more flexible forms of player-NPC interaction within an RPG. Chapter 5 operationalises this investigation through the design of *Turing*, while Chapter 6 provides participant evidence concerning conversational freedom, realism, immersion, and engagement, alongside more qualified findings concerning wider narrative agency. Chapter 7 then considers these findings against the literature.

The resulting contribution is an evidence-based account of how free-form NLI can support player perceptions of NPCs as responsive narrative agents within the

context of an RPG. Rather than replacing authored narrative structures, the findings indicate that NLI can operate within them to provide players with greater freedom over how narrative information is explored and how interactions with NPCs unfold. The research further distinguishes this conversational freedom from wider narrative agency, indicating that broader player influence depends on how dialogue is connected with game-state changes and narrative consequence.

Methodological Contribution

Methodologically, the thesis contributes the design and evaluation of a functioning RPG prototype through which contemporary NLI can be examined in a gameplay context. This contribution is driven by the need identified through Chapters 2 and 3 to investigate NLI using systems that provide greater conversational flexibility than the restricted dialogue approaches encountered in previous research and participant experience.

Chapter 4 establishes the mixed-methods evaluation used to investigate these interactions. Open-text questionnaire responses are analysed using reflexive thematic analysis, while structured responses are examined through frequencies and percentages alongside selected exact inferential tests where these directly contribute to the research questions. Chapter 5 documents the development of *Turing* and demonstrates how findings from the literature review and pilot study were translated into design requirements covering narrative design, written and spoken interaction, NPC responses, conversational history, HCI, and system architecture. Chapter 6 demonstrates the application of this methodology through participant testing.

Together, these chapters provide a documented approach for designing and evaluating NLI-driven NPC interaction within a playable RPG prototype. By connecting theoretical research, preliminary participant investigation, prototype development, and complementary qualitative and quantitative analysis, the approach can be reproduced, adapted, or extended in subsequent research.

Empirical Contribution

Empirically, the contribution is a body of participant data concerning player responses to free-form NLI within an RPG. This contribution is driven by the limited evidence identified through the literature review concerning how players experience contemporary NLI systems when they are integrated directly into narrative gameplay,

rather than encountered as standalone conversational technologies or more restricted game interactions.

Chapter 4 defines the data collection and questionnaire methodology used to investigate these responses. Chapter 6 presents the resulting quantitative and qualitative evidence concerning enjoyment, immersion, narrative agency, realism, intuitiveness, conversational freedom, engagement, and participant perceptions of new game-design possibilities. It also records limitations identified by participants, including response delays, conversational misunderstandings, limited situational awareness, contextual knowledge, and conversational depth.

Chapter 7 then compares these findings with both the pilot study and existing literature. The empirical contribution is therefore contemporary player-experience evidence concerning how free-form NLI-enabled NPC interaction is perceived within the specific context of a narrative RPG. This evidence provides insight into both the perceived benefits of the approach and the limitations that remain when NLI is incorporated into a playable game environment.

Practical Contribution

Practically, the contribution relates to design considerations identified through the development and evaluation of *Turing*. These are driven by challenges identified across the literature review and pilot study, and by the practical requirements encountered when implementing free-form NLI within a functioning game. Chapter 5 documents how these considerations were addressed through the prototype, including contextual NPC knowledge, conversational history, narrative integration, input methods, interface design, and feedback systems.

Chapter 6 provides evidence concerning which aspects of this implementation were positively received and where limitations remained. Participants responded positively to conversational freedom, responsiveness, immersion, and the ability to influence how interactions developed, while also identifying problems including response delay, situational awareness, conversational depth, ambiguity, and access to desired information. These findings are brought together in Chapter 7 to identify considerations for subsequent research and development.

The practical contribution is therefore a set of evidence-informed design considerations for researchers and developers investigating NLI-enabled narrative systems, rather than a prescriptive set of universal best practices. These include

balancing conversational freedom with contextual control, maintaining appropriate NPC knowledge and narrative coherence, managing player expectations, and ensuring that technical implementation remains sufficiently responsive to support the intended player experience.

Taken together, these contributions follow a clear progression across the thesis: Chapter 2 establishes the research problem, Chapter 3 tests its relevance against preliminary player perceptions, Chapters 4 and 5 translate these findings into an evaluable prototype and methodology, Chapter 6 provides the main empirical evidence, and Chapter 7 interprets the resulting contribution to existing knowledge and future practice. The contribution of the thesis therefore lies not in NLI technology alone, but in demonstrating and evaluating how contemporary natural-language systems can be incorporated into narrative RPG design to support more flexible forms of player-NPC interaction.

1.5 Significance of this Research

The significance of this research lies in examining NLI at a point when developments in NLP and generative systems have made more flexible forms of player-NPC communication increasingly practical to implement. While NLP technologies continue to evolve and have been widely adopted in other contexts, their application within narrative-driven games remains an area in which further design and player-experience research is required, particularly in ways that support open-ended, player-directed storytelling.

From an academic perspective, the study extends the current discourse in narrative game studies, offering a developed example of NLI being integrated into an RPG and evaluated through participant testing. This enables existing discussions around emergent narrative, player agency, NPC believability, and conversational interaction to be considered alongside evidence collected from a contemporary implementation, which is increasingly relevant as the implications of generative technologies in creative practice is explored.

From an industry perspective, the findings provide information relevant to developers exploring adaptive dialogue systems, spoken input, and AI-powered narrative tools. Participants in this study responded positively to several aspects of the NLI implementation while also identifying limitations relating to response times,

misunderstandings, and consistency. These results demonstrate both the potential of the approach and areas that require further development.

Ultimately, this study contributes to a growing body of work examining more expressive, player-centred storytelling models. The significance of the research therefore lies not only in demonstrating that NLI can be incorporated into an RPG, but in examining how players actually respond to the resulting interactions. By centring player experience, evaluating design decisions through structured analysis, and providing a testable prototype, the study provides a basis for further research and development concerned with the relationship between natural language systems, NPC design, and player-driven narrative experiences.

1.6 Thesis Outline

This thesis is structured into seven chapters, with each chapter building upon the previous to form a cohesive investigation into the integration of NLI in RPGs. The Introduction establishes the research context, questions, and objectives. Chapter 2 explores existing research on narrative design, NLI, and HCI, identifying gaps that this study aims to address. Chapter 3 presents preliminary research via a pilot study that informs the experimental framework. Chapter 4 outlines the research design, data collection methods, and ethical considerations. Chapter 5 details the creation of the prototype game, Turing, which serves as the experimental platform for testing NLI-driven NPC interactions. Chapter 6 evaluates the effectiveness of NLI systems based on participant feedback, measuring engagement, narrative immersion, and NPC responsiveness. Finally, Chapter 7 reflects on the study's key findings, contributions, limitations, and potential future directions. The structure and contents of these chapters are summarised as follows:

Chapter 1 – Introduction

This chapter establishes the foundation for the thesis by outlining the research context, identifying the problem space, and articulating the rationale for investigating NLI in RPGs. It introduces the central research questions, defines the study's aims and objectives, and presents the methodological approach used to explore the integration of modern NLI systems into game narrative design. The chapter also highlights the author's positionality, intended audience, and ethical considerations around the use of AI technologies. Finally, it provides an overview of the structure of

the thesis and frames the research contributions and significance within both academic and industry contexts.

Chapter 2 – Literature Review

This chapter provides a comprehensive review of existing research relevant to narrative design, NLI, and HCI within the context of RPGs. It examines the evolving role of interactive storytelling and the integration of NLI-driven systems, particularly in how they may influence NPC behaviour, player agency, and emergent narrative experiences. The chapter is structured into three key areas:

- An exploration of narrative design in video games, focusing on NPCs as dynamic storytelling agents.
- An analysis of NLI systems, including their potential for conversational freedom, collaborative storytelling, and the challenges of maintaining narrative coherence.
- A discussion of HCI principles in games, addressing the technical and design considerations for integrating NLI technologies into immersive gameplay.

Through this review, the chapter identifies critical gaps in existing research, reinforcing the need for further investigation into how NLI can reshape interactive storytelling in RPGs, and establishes the foundation for the study's research questions.

Chapter 3 – Pilot Study

Next, the pilot study was conducted to gather preliminary insights into player interaction patterns, narrative engagement, and perceptions of NLI in RPGs. Building upon the gaps identified in the literature review, the pilot study explores key areas such as game narrative design, NPC interactions, and HCI. The study utilises a questionnaire-based approach to assess how players respond to NLI-driven dialogue systems, examining their expectations, preferences, and perceived challenges in interactive storytelling. The results provided preliminary evidence that could be considered alongside the theoretical insights identified in the literature, offering a foundational understanding that shaped the design of the main research experiment. By analysing participant feedback, the study identified alignments and discrepancies between existing research and player experiences, highlighting key areas for further investigation in NLI-driven game design. These findings also enabled iterative refinements to the main study's design, ensuring it was better aligned with player

expectations and research priorities. Ultimately, the findings from this chapter informed the evaluation methodology, ensuring that subsequent research effectively addresses the complexities of integrating NLI into RPGs.

Chapter 4 – Evaluation Methodology

The evaluation methodology establishes the methodological framework for investigating the impact of NLI on narrative design in RPGs. Building on the insights gained from the pilot study, it defines the experimental design approach, detailing the evaluation strategies, participant recruitment process, and data collection methods. The study uses a mixed-methods approach, combining qualitative and quantitative techniques to assess how players engage with NLI-driven NPCs. Ethical considerations, including informed consent and data protection protocols, are also outlined to ensure research integrity. A structured questionnaire was developed to capture player perceptions of immersion, agency, and NPC responsiveness, aligning with the study's research objectives. By establishing a systematic evaluation process, this chapter provides a clear basis for collecting, analysing, and interpreting the findings, setting the stage for the design and development of the experimental prototype.

Chapter 5 – Design and Development

This chapter details the design and development of the prototype game, Turing, which serves as the experimental platform for testing NLI in RPGs. The chapter begins by outlining the objectives of the prototype, defining what players are expected to accomplish and how their interactions will be measured. Key insights from the literature review and pilot study inform the design process, ensuring that the prototype aligns with the broader research aims. The chapter then provides a technical breakdown, covering hardware and software requirements, NLI solutions, plugins, and system architecture. A structured examination of the game's mechanics, NPC behaviour, narrative design, and level layout follows, illustrating how these elements work together to create an interactive narrative experience. Further sections explore HCI considerations, user interface and user experience design, and feedback systems to optimise player engagement. The chapter concludes with a discussion of deployment strategies, ensuring that the prototype is suitable for participant testing.

Chapter 6 – Results and Data Analysis

Next, the outcomes of the experiment are presented, focusing on the data collected

from participants who engaged with the Turing prototype game. The chapter begins by detailing the testing conditions and participant sample size, establishing the context and consistency of the dataset. It then delivers a structured analysis of participant feedback, organised around the thesis's core research themes. This analysis evaluates how players responded to the use of NLI within gameplay, particularly in terms of narrative engagement, realism, and interactivity. Key findings are highlighted and interpreted in the context of the wider research aims, offering insights into the effectiveness of the prototype design. The chapter concludes by highlighting the results and preparing the ground for the final discussion and conclusions in the subsequent chapter.

Chapter 7 – Discussion and Conclusion

Finally, this chapter brings together the findings of the research, offering a critical reflection on the study's outcomes and their wider significance. It begins with a summary of the most important insights gained from the experiment, before comparing these with the results of the pilot study to assess the progression and development of the research. The chapter then situates the findings within existing literature on narrative game design, NLI, and HCI, evaluating how the study contributes to or challenges current understanding. Each research question is revisited to assess how effectively it was answered, and the original aims and objectives are reflected upon in light of the outcomes. The chapter also presents the thesis's contributions to knowledge in respect to theoretical, methodological, empirical, and practical perspectives. Finally, it offers recommendations for future research, acknowledges the study's limitations, and reflects on the broader implications for academic inquiry and the evolving design of narrative-driven RPGs using NLI technologies.

1.7 Positionality

As part of this thesis investigation, it is important to understand the background of the research author to contextualise the lens through which the research has been approached. This section is written in the first person to provide transparency around prior experience, expertise, and influences, and how these have shaped the direction of the study and its interpretation.

About the Author

As a senior lecturer in games design, I have spent my academic career teaching

game design across different levels of higher education, alongside work involving public engagement and outreach. This experience has shaped the way I approach game design as both a theoretical subject and a practical development discipline. It has also influenced the emphasis within this research on connecting academic investigation with design problems that can be explored through a working game artefact.

My academic role also involves maintaining relationships between games education and the games industry. I chair industry advisory panels, contribute to curriculum and employability activity, and coordinate industry-facing initiatives including student mentorship, guest lectures, and events participation. These activities provide regular exposure to current industry practices and challenges and have contributed to the applied perspective taken throughout this thesis.

In 2022–2023, I was the recipient of an Innovate UK grant in partnership with Panivox, a digital storytelling company led by industry veterans Philip and Andrew Oliver. The project investigated applications of RichCast, their interactive storytelling platform incorporating natural language interaction, across areas including culture, heritage, healthcare, climate change, and more. My role involved evaluating the platform and producing recommendations concerning its strengths, limitations, and potential development. This work was conducted independently of the research presented in this thesis, but notably contributed to my expertise in NLI technologies and interactive narrative systems.

I also serve as an education advisor for The Independent Game Developers' Association (TIGA). This work has included contributing to course accreditation at other institutions and reviewing benchmark standards relating to games education. The role provides additional context concerning the relationship between academic game development programmes and the expectations of the games industry.

My practical game development experience also informs the research. In 2018, I represented the University of Staffordshire through the Tranzfuser programme, have contributed written work as a featured writer on the *Game Developer* website (formerly *Gamasutra*), and regularly provide feedback on game development projects. These experiences have contributed to my understanding of industry practices, tools, and workflows, enabling me to connect academic theory with real-world application in the development of this research.

Design Knowledge

My teaching and curriculum development have covered several areas directly connected to this research, including narrative design, interactive storytelling, narratology, pre-production, gameplay design, rapid prototyping, experimental game production, and user interface design. Developing and delivering teaching in these areas has required theoretical concepts to be considered alongside their application within practical game development.

My design expertise is also rooted in my own academic journey. I am a graduate of game design and development programmes at BTEC, undergraduate, and postgraduate levels. During these stages, my work received awards for collaboration, leadership, and academic achievement, including a first-place award at the University of Staffordshire's graduation exhibition awarded by a panel of game industry professionals. This progression ultimately led to being offered a PhD scholarship, enabling me to pursue research that builds upon my practical knowledge and academic foundations. This progression reflects my dedication to the craft of game design and skills that directly inform the practical and theoretical components of this investigative thesis.

In summary, my background has shaped both the subject and approach of the thesis. My previous experience in narrative design, game development, education, and NLI meant that the research was informed from an existing interest in the potential of these systems. My ongoing engagement with both academic and industry communities provides a dual perspective that ties theoretical inquiry with practical application. This positionality not only informs my approach to narrative design and NLI but also supports a deeper understanding of the current and future needs of the games industry. As such, the presented research offers a perspective that is academically rigorous, industry-aware, and contextually informed.

1.8 Intended Audience and Use of Findings

This thesis is written for a diverse audience that includes both professional practitioners and academic researchers, with the goal of making its findings accessible and useful across multiple contexts. The primary audiences include game developers, particularly those working within the narrative design and user experience subfields, as well as academic researchers, educators, and students within the fields of game studies, HCI, AI, and general game development education.

For the games industry, the findings are most directly relevant to RPGs and other games in which dialogue and character interaction form an important part of the player experience. The findings may also provide practical considerations for professionals working in other game contexts, particularly around conversational flexibility, contextual NPC knowledge, narrative coherence, and player engagement.

The documented process also offers a tested methodology and prototype model to independent developers that can be adapted or expanded upon with relatively accessible tools. By documenting the integration of publicly available AI platforms, such as OpenAI's GPT and Google's speech services, the thesis demonstrates how emerging technologies can be used even in resource-limited development settings.

Within academia, this work contributes to the growing body of interdisciplinary research at the intersection of game design, narrative, and AI-driven interaction. It will be of interest to researchers exploring the advancement of interactive storytelling, NLI in digital gameplay environments, and impact of HCI on the player experience. Additionally, the design process and participant evaluation provides material for educators considering contemporary design challenges and growing technologies within games design and development programmes.

The thesis has also been written with a wider audience of readers in mind, including those who may be exploring related themes in their own work, and care has been taken to ensure that the content remains readable and approachable. This thesis is written with clear language, structured analysis, and transparent reporting of descriptive statistics alongside selected exact inferential tests to make the findings interpretable across different disciplinary backgrounds.

Overall, the findings of this thesis are intended to serve as a journey through theory and practice, offering insights that are adaptable to industry application, academic investigation, and educational development, while encouraging further exploration into the future of interactive narratives and natural language systems in digital games.

1.9 Ethical Disclosure: Use of AI Technologies

In the interest of transparency, it is important to acknowledge the use of AI in the development of this thesis, particularly given the increasing role that modern AI plays in the digital landscape. AI tools were utilised to assist with presentation refinement, grammar and spelling corrections, and also general improvements to readability

throughout this investigation. These tools were used with the intent of ensuring that the thesis remains accessible to a broad audience, including those from both academic and industry backgrounds.

Additionally, generative AI was incorporated as part of the experimental artefact developed for this study. Specifically, it was used to generate dynamic, contextually relevant dialogue for NPCs during natural language interactions with testing participants. However, it is important to note that this implementation served a functional role in facilitating the research and is not the core focus of the thesis. The generative content was used to enable the investigation into player-NPC interactions, rather than being the subject of critical analysis itself.

This use of AI technologies is in full compliance with the academic integrity policies set out by the University of Staffordshire. The University's guidance recognises that AI tools may be used to support creative and writing processes, provided that the final work is a result of the academic's own research and original learning. In line with this, all core aspects of this research are entirely original and the result of the author's own work, including the review of the literature, design of the study, development of the artefact, research methodology, data collection and analysis, and overall contribution to knowledge.

To further demonstrate how AI has been used as a writing support tool, the following example shows a comparison between the author's original draft and the AI-assisted revision:

- Original writing by the author:
  "Generative AI was used as part of the solution for the developed artefact in order to create unique dialogue for the testing participants during natural language interactions, however this is not the focus of the thesis and was included to facilitate the true intent of the investigation."
- Revised version with AI assistance:
  "Generative AI was incorporated as part of the experimental artefact developed for this study. Specifically, it was used to generate dynamic, contextually relevant dialogue for NPCs during natural language interactions with testing participants. However, it is important to note that this implementation served a functional role in facilitating the research and is not the core focus of the thesis."

This example illustrates how AI was used to enhance clarity, structure, and tone, without replacing the underlying meaning, intention, or academic substance of the work. Overall, AI was used strictly as a supportive aid, not as a substitute for academic rigour, creativity, or scholarly contribution.

Chapter 02: Literature Review

2.1 Introduction

Game studies has evolved into a widely researched field, encompassing diverse perspectives on game design, player interaction, and narrative development. As interactive storytelling continues to advance, new methodologies emerge to enhance player agency, immersion, and engagement. This research situates itself within contemporary developments in narrative design, focusing on the integration of natural language interaction (NLI) and its impact on emergent storytelling and NPC interactions. While this study primarily explores modern innovations in narrative-driven game design, those interested in foundational principles on game writing and narrative construction may refer to the following publications that provide essential insights into the established standards of storytelling in games:

- *Writing for Games: Theory and Practice* by Hannah Nicklin (2022).
- *Game Writing: Narrative Skills for Videogames* by Chris Bateman (2021).
- *Professional Techniques for Video Game Writing* by Wendy Despain (2020).

Building on the foundational goals of the thesis, this chapter focuses on a comprehensive review of the existing literature relevant to narrative design, NLI, and human-computer interaction (HCI) around the context of role-playing games (RPGs). The aim of this chapter is to identify key insights, challenges, and opportunities that reinforce the integration of NLI-driven systems into RPGs, specifically focusing on how such systems impact narrative engagement, player interaction, and technical feasibility.

In the first section, the investigation begins by examining the role of narrative design in video games, with a particular emphasis on the contributions of non-player characters (NPCs) to emergent storytelling and player agency. This section highlights the potential of NLI systems in enhancing NPC behaviour, fostering rewarding narrative experiences, and supporting player freedom within dynamic game worlds.

The second section discusses the application of NLI systems, exploring their ability to enable conversational freedom, collaborative storytelling, and interactive problem-solving. This section also identifies challenges, such as maintaining narrative coherence and adapting to unpredictable player inputs, while considering the opportunities presented by modern natural language processing (NLP) technologies.

Subsequently, the third section examines the principles and applications of HCI in video games, highlighting the distinct priorities of HCI in games, which emphasise challenge and immersion over traditional usability concerns. The discussion also addresses the technological challenges of integrating modern NLP into responsive, player-focused systems.

Each of these areas is also evaluated in terms of their relevance to the thesis, providing a cohesive foundation for addressing the research questions. The findings of the literature review highlight the significance of NLI-driven systems in enhancing narrative and player interaction, while also exposing critical gaps in existing research that the thesis aims to address.

Finally, this chapter concludes by synthesising the key takeaways from the reviewed literature and establishing the research questions that guide the broader study. It also acts as a bridge into the pilot study, which provides an early opportunity to examine the relevance of insights gained from this review and informs the subsequent experimental methodology.

2.2 Literature Review: Game Design

The evolution of video game design has positioned narrative as a critical component of player engagement, with NPCs at the forefront of this transformation. As games increasingly blend structured storytelling with player-driven dynamics, the design of believable NPCs and emergent narratives has become a focal point for researchers and developers. This section explores how innovations in narrative game design, NPC development, and genre-specific frameworks like RPGs contribute to immersive player experiences. It also examines the transformative potential of NLI to redefine how players interact with modern game worlds and characters. By synthesising insights from key studies, this section establishes a foundation for understanding the interplay between narrative mechanics, NPC believability, and the evolving role of player agency in shaping interactive storytelling.

2.2.1 Narrative in Video Games

In a review of narrative in video games, Koenitz identifies narrative game design as a field intertwined with the broader conversation of ludonarrative theory, particularly its role in merging storytelling with interactive experiences (Koenitz, 2024). Koenitz highlights how narrative can be both embedded and emergent, with embedded narratives providing structured story elements through objects or environments that

inform the story, and emergent narratives arising from player interactions within the game's systems (Jenkins, 2004). This conceptual framework underscores the flexibility of video game narratives, distinguishing them from traditional, linear storytelling.

In relation to NPC design, narrative game design deeply influences NPC development, as NPCs often function as conduits for storytelling. The ‘Narratology vs. Ludology’ debate is particularly relevant here, which contrasts video games as narrative-driven media (narratology) against their mechanics-focused, interactive nature (ludology) (Veloya, 2023). The debate cited in Koenitz’s review is important as it highlights how emergent narrative relies heavily on NPCs whose behaviour and dialogue adapt to the player's actions. Jenkins’ typology of enacted narratives emphasises NPC roles that allow players to embody characters within a story universe, suggesting that well-designed NPCs can enhance immersion by responding meaningfully to player inputs.

To advance narrative design for player interaction, Koenitz points to hybrid approaches that combine structured storytelling with procedural generation, as seen in works such as *No Man’s Sky* (Hello Games, 2016) and *Diablo IV* (Blizzard Entertainment, 2023). These techniques allow for the creation of dynamic worlds and characters that evolve based on player decisions. The System, Process, Product (SPP) model previously proposed by Koenitz (2010) further supports this evolution by integrating player actions into a system that produces varied narrative outcomes, creating a unique story experience for each user.

A compelling avenue for advancing narrative game design lies in incorporating NLI. Koenitz discusses narrative as a means of fostering player agency and immersion, which are qualities that NLI could significantly enhance. By enabling players to communicate with NPCs and influence storylines using conversational language, games could achieve unprecedented levels of interactivity and depth. For example, integrating artificial intelligence (AI) driven dialogue systems into NPC design could allow for real-time story evolution based on nuanced player inputs, creating narratives that are both personal and adaptive. This aligns with emerging technologies in generative AI, which can dynamically craft contextually relevant dialogue, blurring the line between structured and emergent storytelling. At this point, it is worth acknowledging that during the course of this thesis, generative AI technologies have drawn significant attention and become highly newsworthy,

reflecting their rapid development and transformative potential across different fields. This rapid pace of innovation gives emphasis to the potential of generative AI to develop narrative design in a way that was barely imaginable just a few years ago.

Koenitz's work offers a robust framework for understanding narrative game design and its implications for NPC development and player interaction. Future advancements, particularly those involving NLI, hold the potential to redefine narrative-driven games by fostering deeper immersion and player agency. These innovations could transform NPCs from static agents into dynamic participants in co-created storytelling experiences.

2.2.2 Dramatic Situations as a Heuristic for Narrative Game Design

Jenkins' concept of emergent narratives emphasises the co-creation of stories by players through their interactions with the game world (Jenkins, 2004). This perspective aligns with a proposal by Lessard and Paré-Chouinard, in which dramatic situations are presented as a mid-level design heuristic for emergent narrative systems (ENS) (Lessard & Paré-Chouinard, 2022). Building on Polti's 36 Dramatic Situations (1895-1921), the authors argue that these archetypical narrative states provide a bridge between low-level game mechanics and the emergent story possibilities they aim to generate. Unlike scripted narratives, dramatic situations afford flexibility by being sequence-independent and character-productive, allowing unique narrative arcs to appear dynamically within a game's possibility space.

Lessard and Paré-Chouinard evaluate their theory in the *Chroniqueur* project, embedding conditions for dramatic situations in a simulated game world. Through examples like 'supplication' and 'vengeance', they illustrate how dramatic situations enhance 'tellability', which is the likelihood of producing story-worthy events. However, they caution that over-reliance on repetitive patterns may reduce the novelty of emergent narratives, a challenge also noted by Calleja (Calleja, 2013).

Dramatic situations provide a robust framework for designing NPCs as narrative agents. In this approach, NPCs are not merely passive carriers of predefined plots but active participants in generating dynamic storylines. The independence of dramatic situations from specific characters allows NPCs to adapt their roles dynamically based on the player's actions and the evolving game context. This aligns with earlier findings that describe ENS as 'story landscapes' with dramatic peaks shaped by NPC interactions (Louchart, et al., 2006).

For example, NPCs in *Chroniqueur* gain characterisation as they navigate dramatic situations, such as becoming vengeful or manipulative based on their interactions. This adaptability could be further enhanced by incorporating personality traits or behavioural models, creating more complex and lifelike NPCs that engage players on a deeper narrative level.

Dramatic situations foster greater player involvement by inviting players to directly shape the narrative through their input. By situating players within a narrative possibility space, these systems enable a co-creation of stories where player decisions influence outcomes. This resonates with Pearce's emphasis on player-driven experiential narratives and the need for systems that support both emergent and embedded storytelling (Pearce, 2004).

A promising extension of dramatic situations and emergent narrative systems is integrating NLI to enhance player engagement. By enabling players to communicate with NPCs or influence dramatic situations using conversational freedom, NLI can make narrative systems more accessible and immersive. For example, NPCs could use AI-driven dialogue to respond dynamically to player inquiries or commands, altering the course of a narrative exchange. Additionally, players could directly discuss, investigate, or argue within the narrative, increasing their sense of agency and connection.

According to Lessard & Paré-Chouinard, emergent narrative systems like *Chroniqueur* already rely on co-creation, where players 'fill in the blanks' of the story. NLI could amplify this by allowing players to shape not only actions but also motivations and relationships through dialogue, therefore bridging the gap between human and AI storytelling.

Integrating insights from Lessard and Paré-Chouinard into the broader context of narrative game design reveals the potential of dramatic situations as a powerful tool for emergent storytelling. By aligning NPC behaviour, player interaction, and NLI systems with these dramatic structures, designers can create games that are not only narratively rich but also deeply engaging. Further research should explore the implementation of NLI to further enhance player-NPC dynamics, enabling richer co-created stories within ENS frameworks.

2.2.3 Interactive Drama Systems and Genre Considerations

Arinbjarnar et al. define interactive drama as an experience where users engage deeply with a virtual world, interacting with NPCs and objects to shape a dynamically evolving narrative (Arinbjarnar, et al., 2009). This aligns with broader discussions in narrative game design, such as Lessard and Paré-Chouinard's emphasis on emergent narratives, wherein players co-create stories through their actions (Lessard & Paré-Chouinard, 2022). However, Arinbjarnar et al. highlight the challenges of achieving variability and dramatic structure within interactive drama, citing reliance on pre-defined plot graphs in systems like *Façade* (Mateas & Stern, 2003). While effective at generating coherent narratives, such systems often lack scalability and replayability, limiting their appeal for long-term player engagement.

Interactive drama systems reviewed by Arinbjarnar et al. underscore the critical role of NPCs as narrative agents. Systems like *Façade* (Mateas & Stern, 2003) demonstrate how NPCs can act autonomously within predefined plot structures, adapting to player actions to support narrative coherence. However, the reliance on pre-scripted beats and limited autonomy constrains the depth of NPC interactions. Arinbjarnar et al. advocate for hybrid approaches that blend autonomy and centralised control, enabling NPCs to react dynamically while supporting the dramatic structure, which is a principle echoed in *Chroniqueur's* use of dramatic situations.

Future advancements could explore procedural generation of NPC dialogue, allowing for more diverse and lifelike interactions. Such developments could develop the narrative experience, particularly in RPGs where player-NPC relationships often drive engagement.

Arinbjarnar et al. also emphasise that genre heavily influences the design of interactive dramas. RPGs, with their emphasis on narrative depth, character development, and player agency, offer an encouraging area for further research. Unlike first-person shooter (FPS) or adventure games, RPGs inherently support complex worldbuilding and story arcs, making them ideal for integrating interactive drama systems. For example, the authors highlight *Fallout 3* (Bethesda Game Studios, 2008), where player choices shape not only the narrative but also NPC relationships and world dynamics, reflecting many principles of interactive drama. This example demonstrates the potential for RPGs to serve as a testbed for

interactive drama innovations, particularly when combined with emergent narrative frameworks and procedural systems.

The paper also notes that traditional interactive drama systems often limit player interaction to predefined choices, which can reduce immersion. NLP offers a promising solution by enabling players to communicate with NPCs more freely. Systems like *Façade*, which incorporate basic and outdated NLP, have shown the potential for such interactions but also highlight the technological challenges, such as limited comprehension and the risk of frustrating players with constrained input parsing.

Incorporating NLI into RPGs could improve player experiences, allowing for more conversational freedom, personalised narratives, and dynamic NPC responses. This aligns with Lessard and Paré-Chouinard's vision of co-created narratives, where players actively shape the story through their interactions (Lessard & Paré-Chouinard, 2022).

The integration of interactive drama systems with RPGs represents a promising research direction. By leveraging genre-specific strengths, such as narrative complexity and player agency, researchers can develop systems that enhance immersion and replayability. Incorporating NLI into these systems could further elevate the experience, bridging the gap between emergent storytelling and player-driven narratives. Further research should focus on overcoming scalability challenges and expanding the use of procedural and hybrid approaches to NPC behaviour and plot generation, ensuring that interactive drama systems can support the evolving demands of players.

2.2.4 The Role of NPCs in Narrative Game Design

Warpefelt and Verhagen identify NPCs as fundamental components in creating believable and engaging game worlds (Warpefelt & Verhagen, 2017). The concept of **'**characterhood**'** emerges as central to NPC believability, distinguishing them from non-interactive objects or static elements in the game environment. By actively portraying roles and engaging with players through visual cues, behaviours, and interactions, NPCs contribute significantly to both embedded and emergent narratives, as defined by Jenkins (Jenkins, 2004). For example, a vendor NPC advertising wares in a medieval market serves not only as a functional game element but also as a narrative tool that enriches the game world's ambience.

This interplay between narrative and functionality underscores the holistic approach needed in NPC design, bridging mechanical (ludic) and narrative (thematic) elements (Juul, 2001). This aligns with insights from Lessard and Paré-Chouinard, who emphasise the role of dramatic situations in emergent narratives, where NPCs often function as dynamic agents shaping the player's story experience (Lessard & Paré-Chouinard, 2022).

The Game Agent Matrix (GAM) introduced by Warpefelt and Verhagen categorises NPC behaviour along two axes: social context and NPC architecture. This framework highlights how NPCs of varying complexity, from simple vendors to socially manipulative characters, shape player experiences. For example, manipulators rely on emergent behaviours and advanced social interactions to deceive or influence players, demonstrating the potential for deeper engagement through sophisticated NPC design.

Player expectations play a critical role in NPC believability. Warpefelt previously outlined three key factors players use to assess NPCs (Warpefelt, 2015):

1. **Location & Surrounding Environment:**
   NPCs must fit seamlessly into their context.
2. **Behaviour & Actions:**
   NPCs should show clear and purposeful behaviours.
3. **Attributes & Visual Presentation:**
   Indicators such as attire and animations must align with their role.

NPCs that do not meet these expectations risk breaking immersion, underscoring the importance of aligning NPC behaviour with the game's narrative and ludic framework.

While current NPCs largely exhibit embedded behaviours, following predefined scripts, emergent behaviours represent a promising avenue for enhancing believability. For example, NPCs capable of adapting their social roles dynamically could significantly enhance player interaction. Procedural content generation (PCG) and AI-driven decision-making are highlighted as key tools for enabling such advancements, echoing similar proposals in interactive drama systems by Arinbjarnar et al (2009).

NLI presents another transformative opportunity for NPC design. By integrating conversational AI, NPCs could engage players in meaningful dialogue, enabling greater narrative flexibility and immersion. For example, NPCs could adapt their responses to reflect the player's actions and dialogue choices, fostering a sense of agency and personalisation.

RPGs, with their emphasis on story-driven gameplay, offer an ideal genre for exploring advanced NPC designs. NPCs in RPGs often serve as quest-givers, allies, or adversaries, embodying roles that directly impact the player's journey. Warpefelt and Verhagen's typology highlights examples such as Elizabeth from *Bioshock Infinite* (Irrational Games, 2013), as a sidekick, or Martie Jainrose from *World of Warcraft* (Blizzard Entertainment, 2004-Present), as a questgiver, illustrating how NPCs contribute to both gameplay and narrative.

Future research should prioritise integrating emergent social behaviours into RPG NPCs, enabling them to adapt dynamically to player actions. This aligns with broader trends in narrative game design, such as the shift toward co-created stories driven by player-NPC interactions (Lessard & Paré-Chouinard, 2022). By incorporating NLI, RPGs can evolve into platforms for greater interactive and personalised storytelling.

NPCs are essential to narrative games, serving as a connection between the player and the game world. Enhancing their believability through emergent behaviours and NLI can unlock new possibilities for immersive storytelling. RPGs, with their narrative depth and focus on character-driven gameplay, provide a ground for testing and refining these innovations. By addressing current limitations in NPC design and using emerging technologies, researchers and developers can redefine the boundaries of narrative gaming.

2.2.5 Realism and Believability in NPC Design

AlJammaz et al. differentiate between two concepts often confused in NPC research: realism, which emphasises human-like behaviour, and believability, which focuses on the illusion of life and emotional engagement (AlJammaz, et al., 2023). NPCs that contribute to realism are evaluated based on their alignment with human behaviours and psychological models, while believable NPCs prioritise expressiveness and subjective player experience. For example, realistic NPCs might utilise precise pathfinding or cognitive models, while believable NPCs leverage exaggerated emotions and personality traits to captivate players.

This duality echoes Lankoski and Björk's gameplay design patterns for believable NPCs, where behaviours like 'Awareness of Surroundings' and 'Contextual Conversational Responses' are critical for both player immersion and narrative coherence (Lankoski & Björk, 2007).

This distinction underlines the importance of role contextualisation in narrative game design. An NPC perceived as believable often fits seamlessly into its narrative and ludic context, enhancing immersion through appropriate reactions and interactions (Mateas, 1999). For example, AlJammaz et al. highlight the Valentine butcher in *Red Dead Redemption 2* (Rockstar Studios, 2018) who demonstrates both realism, through contextual commentary and item preferences, and believability, through expressive dialogue and perceived emotions like jealousy. This also aligns with Lankoski and Björk's notion of role-congruent NPC behaviour as an essential consideration for maintaining player immersion and narrative consistency.

NPCs serve as anchors in establishing a game's realism by creating a world that feels authentic and reactive. AlJammaz et al. highlight several attributes of NPCs that contribute to this realism:

1. **Behavioural Predictability and Coherence**
   This is where NPCs must act consistently within the game's rules and narrative logic, reinforcing their roles and the overall world-building.
2. **Social Relationships**
   This is how NPCs with dynamic social relationships foster a sense of interconnectivity and realism within the game world.

These attributes allow NPCs to adapt dynamically to player actions, creating narratives that are both immersive and player-driven, which resonates with Lessard and Paré-Chouinard's exploration of dramatic situations in emergent narrative systems (Lessard & Paré-Chouinard, 2022). For example, NPCs in *Stardew Valley* (ConcernedApe, 2016) and the *Sims* games (Maxis, 2000-Present) exhibit dynamic relationships and independent goal pursuit, reflecting Lessard and Paré-Chouinard's emphasis on NPCs as agents of narrative co-creation. By fostering evolving social systems, these games enhance the realism and believability of their worlds.

Integrating conversational freedom into NPC design offers opportunities to merge realism with player agency. AlJammaz et al. highlight how context-sensitive dialogue

can create realistic and meaningful interactions. This builds on Arinbjarnar et al.'s analysis of interactive drama systems, where natural language was proposed as a means to enhance narrative flexibility and NPC responsiveness (Arinbjarnar, et al., 2009).

RPGs offer a distinctive platform for exploring realistic NPCs, given their focus on character-driven stories. AlJammaz et al.'s insights on role contextualisation in NPCs align with Warpefelt and Verhagen's emphasis on NPC characterhood, where realistic and intentional behaviour differentiates NPCs from static game elements (Warpefelt & Verhagen, 2017). Therefore, advancing NPC design in RPGs involves embedding them in dynamic social systems that evolve with the player's actions. Dynamic storytelling and adaptive dialogues can further enable NPCs to respond to the player's choices, fostering a sense of agency and realism.

Realism in NPC design is essential for creating immersive and engaging narrative games. By bridging the gap between realism and believability, developers can craft NPCs that not only enhance the narrative but also provide meaningful and context-sensitive interactions. Incorporating NLI represents the next progressive frontier, enabling NPCs to simulate complex, realistic behaviours while fostering greater emotional connections with players. RPGs, with their narrative depth and character-driven focus, provide an ideal setting for exploring these innovations.

2.2.6 NPCs and the Role of Increased Information Access

Mahmoud et al. propose a novel approach to NPC behaviour in serious games through the integration of visual perception systems and Hierarchical Task Network (HTN) planning (Mahmoud, et al., 2014). Unlike traditional scripted NPC behaviours, this architecture enables NPCs to adapt dynamically to environmental changes by accessing and processing real-time sensory data. This marks a significant shift toward realism, as NPCs are limited to perceiving only what is within their visual range, which mimics human-like information constraints.

This approach addresses a critical challenge highlighted by Warpefelt and Verhagen, who noted that believable NPCs must exhibit intentionality and consistency in their actions (Warpefelt & Verhagen, 2017). By relying on visual perception, NPCs can prioritise relevant information, such as nearby characters or task-critical objects, aligning their actions with their roles within the game world.

In Mahmoud et al.'s system, NPCs store environmental data in short-term memory for immediate decision-making and long-term memory for accumulated domain knowledge. This architecture facilitates realistic decision-making by:

- Filtering irrelevant data where NPCs process only task-relevant objects, such as fire extinguishers in a firefighting scenario.
- Adjusting plans dynamically where NPCs can adapt their strategies when new information is perceived, ensuring actions remain contextually appropriate.

This aligns with AlJammaz et al. who emphasise the importance of behavioural coherence in NPC design (AlJammaz, et al., 2023). When NPCs react logically to their environment, acknowledging what they can and cannot perceive, they enhance the player's immersion in the game world.

Mahmoud et al. extend the potential for narrative-driven games by integrating HTN planning. This method allows NPCs to break down complex tasks into subtasks, enabling them to achieve goals through emergent and context-sensitive behaviours. For example, NPCs could display more nuanced social behaviours by responding differently to events based on their prior interactions with the player, echoing themes from Lankoski and Björk's design patterns (Lankoski & Björk, 2007).

The reliance on real-time sensory data enhances player-NPC interactions by fostering a sense of conversational freedom. By limiting NPC knowledge to perceived and learned information, developers can create interactions that feel more authentic. Players can engage in dialogue or actions that reveal or obscure information from NPCs, influencing their behaviour.

This supports earlier arguments from Arinbjarnar et al., who advocated for NPCs capable of responding to player inputs with adaptive, context-sensitive dialogue (Arinbjarnar, et al., 2009). Combining this with NLI could further enhance how players perceive NPCs:

- NPCs could use sensory data to inform their dialogue choices, acknowledging environmental changes or the player's actions in real-time.
- NLI could allow players to question NPCs about specific objects or events within the game world, creating more immersive gameplay experiences.

RPGs stand out as an ideal genre for exploring NPCs with advanced information access. The complexity and depth of RPG narratives demand NPCs that can adapt to player choices while supporting consistent behaviours. The integration of HTN planning in RPGs could support emergent storytelling, where NPCs react to player input, fostering unique narratives for each player.

This also builds on Lessard and Paré-Chouinard's framework for dramatic situations, where NPCs function as agents of co-created narratives (Lessard & Paré-Chouinard, 2022). By incorporating real-time information processing, RPG NPCs can contribute to narratives that feel more personal and player driven.

Mahmoud et al.'s integration of HTN planning demonstrates the potential for NPCs to achieve greater realism through dynamic information access. This approach aligns with prior research emphasising the importance of believable and adaptable NPC behaviour in narrative-driven games. By incorporating these systems into RPGs, developers can create NPCs that not only enhance realism but also provide players with richer, more immersive interactions. Further research would benefit from combining these approaches with natural language systems to enable conversational freedom and promote deeper connections between players and NPCs.

2.3 Literature Review: Game Design - Key Takeaways

The literature review highlights critical advancements and ongoing debates in narrative game design, focusing on the role of NPCs, emergent storytelling, and the integration of advanced technologies like NLI. Key insights include the following:

1. **Narrative Flexibility and Emergence**:
    - Video game narratives are increasingly defined by their ability to combine embedded storytelling (structured, pre-authored content) with emergent storytelling (arising dynamically from player actions) (Jenkins, 2004; Koenitz, 2024).
    - Tools like dramatic situations offer a robust heuristic for designing games that prioritise emergent storytelling while maintaining narrative coherence (Lessard & Paré-Chouinard, 2022).
2. **The Integral Role of NPCs**:

- NPCs serve as critical conduits for narrative delivery, embodying roles that bridge mechanical (ludic) and thematic (narrative) elements (Warpefelt & Verhagen, 2017).
- Innovations in NPC design, including adaptive behaviours and contextual interactions, enable them to function as dynamic participants in storytelling rather than static agents (Arinbjarnar, et al., 2009).

3. **RPGs as a Testbed for Innovation**:
    - RPGs, with their emphasis on player agency and narrative depth, emerge as ideal platforms for exploring advanced NPC and narrative systems, such as dynamic storytelling and interactive dramas (Arinbjarnar, et al., 2009).
4. **Natural Language Interaction as a Game Changer**:
    - NLI technologies indicate an evolution in narrative design by enabling conversational freedom, allowing players to directly influence NPCs and storylines through dialogue (Mahmoud et al., 2014; Koenitz, 2024).
    - Systems like *Façade* demonstrate the potential of NLI to create dynamic and immersive interactions, though technological challenges remain (Mateas & Stern, 2003).
5. **Realism and Believability**:
    - Believable NPCs enhance realism by aligning with human-like behaviours and psychological models (AlJammaz, et al., 2023).
    - Incorporating perceptive systems into NPC architectures ensures their actions remain contextually relevant, mimicking human information constraints (Mahmoud, et al., 2014).
6. **Emergent Challenges and Opportunities**:
    - Developers must balance player-driven narrative freedom with the scalability of systems like emergent behaviours, especially in complex genres like RPGs (Lessard & Paré-Chouinard, 2022).

- Future research should explore how advanced NLI can integrate into existing frameworks to enhance player agency and storytelling depth.

This section establishes a foundation for understanding how game design innovations intersect with narrative dynamics, NPC realism, and player interaction. The next sections on NLI and HCI will build upon these insights, focusing on how technologies enable deeper connections between players and virtual worlds.

2.4 Literature Review: Natural Language Interaction

Modern NLI introduces a new dimension to narrative game design by enabling players to communicate with NPCs through free-form text or spoken language. Unlike traditional menu-driven dialogue systems, NLI fosters conversational freedom, allowing players to express themselves creatively and actively shape their interactions. This approach builds NPCs into dynamic participants in storytelling, creating opportunities for greater engagement and emergent narrative experiences.

This section explores the role of NLI in modern games research, focusing on its applications in enhancing storytelling and advancing player interaction. It examines how NLI promotes nonlinear and collaborative narrative creation, contributes to role-playing opportunities, and enhances player agency. The discussion also addresses the challenges associated with implementing NLI, including maintaining coherence and adapting to player-driven unpredictability, while highlighting its potential for narrative-driven genres like RPGs. By investigating these themes, the section establishes NLI as a key consideration for innovative and immersive narrative game design.

2.4.1 Designing Natural-Language Game Conversations

Lessard identifies NLI as a critical yet underexplored mode of player-NPC communication in narrative game design (Lessard, 2016). NLI enables players to engage NPCs using free-form text or spoken language, fostering a level of conversational freedom and creativity absent in menu-driven dialogue systems.

An important precedent for this interaction can be found in text-based adventure games and interactive fiction. Montfort identifies *Adventure*, also known as *Colossal Cave Adventure* (Crowther & Woods, 1976), as a foundational work in interactive fiction and traces its influence through later text adventures such as *Zork* (Infocom, 1977) and the commercial works produced by Infocom (Montfort, 2005). These games present players with textual descriptions of a game world and allow them to

interact by entering written commands. Rather than selecting from a predefined list of actions, players construct their own input for the game to interpret, making language a direct method of interaction within the simulated environment.

This provides an early example of the relationship between natural language and player agency that remains relevant to contemporary NLI. Hausknecht et al. describe interactive fiction as a text-based simulation in which players issue language commands to change the environment and progress through the narrative (Hausknecht, et al., 2020). However, the apparent freedom offered by these systems is restricted by the vocabulary and command structures understood by their parsers. Although players can enter a wide range of phrases, only recognised inputs can produce meaningful changes within the game. This creates a distinction between the freedom to provide natural-language input and the system's ability to understand that input, a problem that continues to be relevant when designing modern conversational systems.

More recent research continues to use parser-based interactive fiction as a means of investigating natural-language understanding. Ammanabrolu and Riedl describe games such as *Zork* as environments in which interaction involves perceiving, acting upon, and communicating with a world through textual descriptions, commands, and dialogue (Ammanabrolu & Riedl, 2021). Their work also highlights the complexity created by natural-language action spaces, where even a limited recognised vocabulary can produce a substantial number of possible commands. This demonstrates that text adventures provide more than a historical precedent for NLI; they also continue to present relevant problems concerning language interpretation, context, and the relationship between player intention and system understanding.

Alongside text adventures, early conversational programs such as ELIZA (Weizenbaum, 1965), which simulated therapist-like interactions, demonstrated how written language could be used to create the impression of communication between a user and a computer system. Although ELIZA was not a game itself, its conversational approach demonstrated the potential of text-based interaction and became influential in later discussions of human-computer communication.

However, the rise of graphical user interfaces and menu-driven systems in the late 1980s shifted game design priorities. Menu-driven dialogue systems offered clarity and ease of use, guiding players through pre-defined narrative options and reducing

the risk of input errors (Lessard, 2016). While this transition prioritised accessibility, it came at the expense of the creative flexibility inherent in NLI, which allowed players to craft their own dialogue inputs. McGath originally described text-based interaction as “more flexible than any joystick or trackball” (McGath, 1985) but the dominance of graphical systems eclipsed the expressive possibilities of natural language during this period.

The contemporary resurgence of NLI owes much to advancements in NLP technologies, which have redefined the capabilities of conversational systems. Tools like *Siri* (Siri Inc., 2011) and *ChatGPT* (OpenAI, 2022) have demonstrated the feasibility of nuanced language understanding, creating renewed interest in integrating NLI into games. Early experiments, such as *Façade* (Mateas & Stern, 2003), highlighted NLI’s potential to produce emotionally responsive NPCs, capable of adapting to real-time player inputs. More recent projects, including the LabLabLab prototypes (*A Tough Sell*, *SimProphet*, and *SimHamlet*), have extended this work by embedding NLI into gameplay mechanics, transforming dialogue into a dynamic and interactive element of the narrative (Lessard, 2016).

The appeal of NLI lies in its ability to support emergent storytelling, where players contribute directly to the narrative through their dialogue choices. Unlike menu-driven systems, which confine players to selecting from predetermined options, NLI allows them to express their creativity, shaping unique storylines and influencing NPC behaviour. This capability aligns particularly well with RPGs, where player agency and character customisation are central to the experience. Yet, as Lessard notes, NLI introduces significant design challenges, such as maintaining coherence in open-ended conversations and addressing instances of miscommunication, often referred to as the “Eliza Effect”.

The reintroduction of NLI into modern game design therefore represents a convergence of historical approaches to text-based interaction and developments in contemporary NLP. Text adventures established an early model in which players could use language to interact directly with a simulated world, but parser limitations restricted the extent to which that language could be understood. Modern NLI provides an opportunity to revisit this interaction model with systems capable of interpreting a broader range of player expression. This progression provides an important foundation for investigating how contemporary NLI can support more flexible player-NPC interactions within narrative-driven RPGs.

2.4.2 Applications of Natural Language Interaction

NLI introduces new dimensions to gameplay by converting dialogue from a passive storytelling mechanism into an interactive and integral part of gameplay. Brusk and Björk identify dialogue as a key gameplay feature, serving not only to communicate narrative but also as a direct interaction system between players and NPCs (Brusk & Björk, 2009). By enabling players to engage NPCs using free-form text or spoken language, NLI fosters creative problem-solving, emergent storytelling, and collaborative narrative construction. These capabilities highlight the transformative potential of NLI in creating more immersive player experiences.

NLI can elevate dialogue into a primary gameplay mechanic by facilitating conversational puzzles, where players solve challenges or progress in the story through meaningful dialogue. In this approach, players must interpret NPC responses, identify conversational cues, and craft appropriate dialogue inputs to achieve specific goals.

Lessard's LabLabLab prototypes, such as *A Tough Sell* and *SimHamlet*, demonstrate the power of conversational puzzles (Lessard, 2016):

- In *A Tough Sell*, players embody the Evil Queen, tasked with convincing Snow White to eat a poisoned apple. Success requires players to earn Snow White's trust while avoiding suspicion, carefully navigating the tone and content of their dialogue.
- In *SimHamlet*, players interrogate a gravedigger about Shakespearean murders, with the puzzle relying on the player's ability to extract useful information through targeted questioning.

These examples illustrate how NLI enhances player engagement by turning conversations into dynamic problem-solving experiences. Unlike menu-driven systems, where players select from a predetermined list of options, NLI encourages experimentation, adaptability, and creativity in dialogue.

Key advantages of conversational puzzles include:

- **Player Agency**
  Where players actively shape their interactions and outcomes by choosing what to say and how to say it.

- **Immersion**
  Which presents conversational mechanics that feel organic and contextually integrated, enhancing the realism of the game world.
- **Replayability**
  When the open-ended nature of NLI encourages multiple approaches to the same puzzle, creating varied outcomes across playthroughs.

One of NLI's most interesting contributions to game design is its ability to facilitate nonlinear storytelling, where conversations evolve based on player inputs and decisions. Unlike traditional menu-driven systems, which often constrain players to fixed narrative paths, NLI allows for open-ended interactions that dynamically influence the direction of the story.

Brusk and Björk highlight game state-based dialogue systems, where NPC responses are shaped by factors such as the player's actions, relationships, and the current narrative context (Brusk & Björk, 2009). This is evident in games like *Morrowind* (Bethesda Game Studios, 2002) and *The Outer Worlds* (Obsidian Entertainment, 2019), where NPC dialogue adapts based on the player-character's reputation, affiliations, and location within the game world. Similarly, *Façade* exemplifies emergent storytelling by allowing NPCs to respond in real time to the player's conversational choices and actions, resulting in a narrative that feels unique to each playthrough.

Emergent storytelling is further shown in Lessard's *SimProphet*, where players collaborate with an NPC to create a fictional religion. By answering NPC-posed questions about rituals, beliefs, and symbols, players co-create a narrative that evolves dynamically based on their inputs. This interplay between player creativity and NPC adaptability showcases NLI's potential to blur the line between authored and emergent storytelling, empowering players to take an active role in shaping the narrative.

In addition to fostering emergent narratives, NLI enables collaborative narrative creation, where players and NPCs co-construct the story through their interactions. In *Façade*, players navigate a domestic drama involving the married couple Grace and Trip, whose responses dynamically adjust to player inputs. This interaction creates a sense of collaboration, where the player's conversational choices influence the trajectory of the narrative.

Collaborative narrative creation benefits from NLI's ability to support mixed-initiative dialogues, where both players and NPCs have the agency to initiate, redirect, or shape conversations. For example, Grace and Trip frequently interrupt the player or introduce new topics, balancing player freedom with NPC autonomy and creating a dynamic storytelling experience.

NLI's seamless integration with broader game mechanics distinguishes it from traditional dialogue systems. Brusk and Björk also emphasise gameplay-integrated conversations, where dialogue unfolds in real time alongside other in-game actions. In *Façade*, NPCs respond to player behaviour and environmental triggers without disrupting the flow of gameplay. This integration enhances immersion, as dialogue becomes an organic part of the game world rather than a separate, structured mechanic. For instance, players can interact with objects in the environment during conversations, and NPCs will acknowledge or respond to these actions. NPC behaviour will also dynamically evolve during gameplay, reinforcing the perception of realism and narrative coherence.

NLI transforms dialogue into a powerful gameplay tool, enabling conversational puzzles, nonlinear storytelling, and collaborative narrative creation. By integrating dialogue into the mechanics of gameplay, NLI creates immersive experiences that actively engage players in shaping the narrative. Its flexibility and open-ended design offer significant advantages over traditional menu-driven systems, particularly in RPGs and narrative-driven games. However, as demonstrated by its implementation in projects like *Façade* and *SimProphet*, the full potential of NLI lies in its ability to blend emergent storytelling with dynamic player-driven interaction.

2.4.3 Advancing Player Interaction through Natural Language Interaction

Bontchev highlights the significant potential of PCG in video games, particularly in creating personalised and adaptive experiences (Bontchev, 2016). While the paper primarily addresses broader PCG trends, its insights on player modelling, adaptive content, and collaborative systems align closely with the goals of NLI. By integrating NLI with PCG techniques, game designers can enhance player interaction through agency, mixed-initiative dialogues, and immersive role-playing opportunities. These dynamics fundamentally reshape how players engage with NPCs, moving beyond traditional menu-driven systems to create more responsive narrative experiences.

NLI amplifies player agency by enabling players to craft unique conversational inputs, directly shaping their interactions with NPCs and the surrounding game world. Bontchev discusses the role of personalisation in adaptive systems, noting how player modelling can tailor interactions to align with individual behaviours and preferences. When applied to NLI, this approach allows NPCs to respond dynamically to player inputs, reflecting not only immediate choices but also long-term patterns of behaviour. This idea echoes Lessard's exploration of *Façade*, where NPCs Grace and Trip dynamically adapt their dialogue based on the player's tone and conversational choices (Lessard, 2016).

For example, an NPC could alter their responses depending on the player's approach, favouring polite dialogue for diplomatic players while reacting defensively to confrontational tactics. This dynamic approach bridges narrative design and emergent gameplay, as described by Brusk and Björk, where NPC behaviour becomes integral to the player's sense of agency within the game world (Brusk & Björk, 2009).

Mixed-initiative dialogues represent a key advancement in NLI, enabling both players and NPCs to take an active role in shaping conversations. Bontchev discusses collaborative procedural systems, where AI and players jointly influence outcomes. This concept parallels mixed-initiative dialogues, where NPCs not only respond to player inputs but also introduce new topics, redirect conversations, or challenge the player's statements.

This approach is seen again in *Façade*, where NPCs actively engage with the player, introducing their own narrative threads and reacting to real-time player behaviours. Mixed-initiative systems enhance replayability by making NPC interactions feel less predictable and more contextually resonant. As Brusk and Björk note, this dynamic creates an interplay between player-driven and system-driven elements, resulting in more organic conversations.

NLI significantly enhances role-playing opportunities by allowing players to express their character's personality, emotions, and motivations through dialogue. Traditional menu-driven systems often restrict role-playing by offering a limited range of pre-authored options. In contrast, NLI provides players with the freedom to input dialogue that aligns with their unique interpretation of their avatar.

Bontchev highlights the importance of adaptive content generation in creating immersive experiences, which is particularly relevant to NLI in RPGs. For example:

- NPCs can use player modelling to remember previous conversations and adapt their behaviour over time, creating the illusion of a living, responsive world.
- Dialogue choices can influence long-term narrative arcs, allowing players to build relationships with NPCs that feel meaningful and consistent.

This aligns with Lessard's findings on emergent storytelling in *SimProphet*, where player contributions directly shape the trajectory of the narrative. By integrating NLI with procedural techniques, RPGs can support emergent role-playing scenarios that evolve dynamically based on player inputs.

While NLI presents exciting possibilities, its successful implementation requires addressing significant challenges. Bontchev identifies the difficulty of maintaining coherence in procedurally generated systems, a challenge that applies directly to NLI. Ensuring that NPC responses remain contextually appropriate and narratively consistent is critical for preserving immersion. This issue echoes the "Eliza Effect" discussed by Wardrip-Fruin, where NPCs create the illusion of understanding but fail to sustain meaningful interactions (Wardrip-Fruin, 2012).

Despite these challenges, integrating NLI with PCG properties offers promising opportunities to track player behaviours and dialogue patterns that allow NPCs to adapt over time, creating increasingly personalised interactions. By generating contextually appropriate responses on the fly, NPCs can also maintain conversational depth across a wide range of player inputs.

These strategies align with Brusk and Björk's emphasis on gameplay-integrated conversations, where dialogue is seamlessly woven into the mechanics of gameplay. For example, NPCs in *Façade* react not only to dialogue but also to the player's physical actions, creating a multi-dimensional interaction system.

Overall, NLI advances player interaction by fostering agency, supporting mixed-initiative dialogues, and enhancing role-playing opportunities. By leveraging procedural systems and adaptive modelling, NLI enables NPCs to respond dynamically to player behaviour, creating personalised and contextual gameplay experiences. These innovations are particularly impactful in RPGs, where character-

driven narratives and emergent storytelling are central. As Bontchev notes, addressing the challenges of coherence and unpredictability will be critical for realising the full potential of NLI. With continued development, NLI stands to redefine how players engage with game worlds and NPCs, connecting narrative design with innovative procedural techniques.

2.5 Literature Review: Natural Language Interaction - Key Takeaways

The reviewed material demonstrates the considerable role of NLI in narrative-driven games, highlighting its impact on NPC design, emergent storytelling, player experience, and conversational freedom. Through its integration into modern game design, NLI fosters more dynamic and personalised player-NPC interactions, supporting the development of immersive narrative experiences. Key insights include the following:

1. **NLI's Historical Context and Revival**:
    - Emerging from early systems like *ELIZA* (Weizenbaum, 1965), NLI originally showcased the flexibility and creativity of natural language in interaction (Lessard, 2016).
    - The decline of NLI in favour of menu-driven systems prioritised usability over conversational freedom. However, advances in NLP have revived NLI, as seen in more relatively modern examples like *Façade* (Mateas & Stern, 2003), demonstrating its capacity for real-time, adaptive narrative design.
2. **Applications of NLI in Narrative and NPC Design**:
    - Through conversational puzzles, NLI enables players to engage in dialogue as a gameplay mechanic, interpreting NPC responses and crafting persuasive or investigative inputs to solve narrative challenges (*A Tough Sell*, *SimHamlet*; Lessard, 2016).
    - NLI encourages non-linear and emergent storytelling that supports dynamic, player-driven narratives by allowing NPC responses and storylines to evolve based on player inputs. For example, *SimProphet* leverages NLI to co-create emergent narratives between players and NPCs, fostering a collaborative storytelling experience (Lessard, 2016).

- Through mixed-initiative dialogues, NPCs actively contribute to conversations by introducing new topics or redirecting discussions, creating a sense of shared narrative agency in collaborative narrative creation (*Façade*; Brusk & Björk, 2009).

3. **Advancing Player Interaction and Experience**:
    - Through conversational freedom, NLI enhances player agency by allowing free-form dialogue that reflects character motivations and influences NPC behaviour, a significant departure from traditional menu-driven systems (Bontchev, 2016).
    - NLI affords role-playing opportunities that can increase immersion in RPGs by enabling players to customise dialogue to align with their characters' personalities and choices. This flexibility supports emergent character development and player expression (Bontchev, 2016; Lessard, 2016).
    - NPCs can encourage mixed-initiative dialogues that guide or redirect conversations, balancing system-driven and player-driven interaction to produce organic and engaging exchanges (Brusk & Björk, 2009).
4. **Challenges of NLI Implementation**:
    - The Eliza Effect means that NPCs may fail to sustain the illusion of understanding, resulting in moments of narrative inconsistency that break immersion (Wardrip-Fruin, 2012).
    - Unpredictable inputs for open-ended player dialogue presents challenges for ensuring coherence and narrative continuity, necessitating innovations in procedural NPC behaviour and dynamic player modelling (Brusk & Björk, 2009; Bontchev, 2016).
5. **Future Directions for NLI Research**:
    - Further research should focus on understanding how modern NLI technologies, such as large language models (LLMs) and advanced NLP systems, impact the player's experience. Investigating how players perceive conversational freedom, coherence, and agency in

these systems can provide insights into designing more immersive and satisfying interactions (Bontchev, 2016; Lessard, 2016).

- RPGs, with their emphasis on character-driven narratives and player agency, remain an ideal genre for exploring NLI's potential. Future work should address the balance between conversational freedom and maintaining narrative coherence (Lessard, 2016; Brusk & Björk, 2009).

This section builds on the first to establish an understanding of NLI's applications in narrative game design, NPC development, emergent storytelling, and player interaction. It highlights the challenges and opportunities presented by NLI, with particular attention to its relevance for RPGs and player-driven experiences. The insights gained from this exploration lead to the next section, which will focus on HCI and its role in facilitating the player experience through interaction systems.

2.6 Literature Review: Human-Computer Interaction

HCI is a foundational discipline in understanding the ways players engage with video games, encompassing the design, functionality, and impact of interfaces on player experience. In the context of gaming, HCI moves beyond traditional usability concerns to prioritise engagement, emotional resonance, and immersion. Unlike productivity-oriented systems, which focus on efficiency and clarity, video game interfaces are designed to challenge, entertain, and enhance the narrative experience.

This section examines the role of HCI in shaping player interaction, focusing on its applications to interface design, player experience, and the integration of developing technologies such as NLI. The discussion explores how HCI principles influence player agency, narrative coherence, and the development of dynamic interactions in games, particularly within narrative-driven genres like RPGs. By analysing key contributions to HCI research related to these areas, this section extends the understanding of the intersection of technology and gameplay.

2.6.1 Human-Computer Interaction and Video Games

Barr et al. highlight how HCI represents a critical area of research within video game studies, focusing on the relationship between users and the systems they interact with (Barr, et al., 2007). HCI in video games is distinct from traditional applications of the field, as it prioritises not only usability but also player engagement, emotional impact, and the integration of narrative within the interactive experience. The unique

position of video games as both software and media creates a complex design space where gameplay must satisfy functional goals while fostering immersive and meaningful experiences for players.

Barr et al. emphasise that unlike productivity software, where usability is the ultimate objective, video games often challenge players by introducing constraints, complexities, and varying levels of difficulty. These features, rather than detracting from the experience, are intrinsic to gameplay and player satisfaction. Therefore, HCI in games shifts its focus from minimising friction to intentionally designing interfaces that engage users in ways that align with the game's intended values. For example, a game's interface may communicate tension or ambiguity, shaping the player's understanding of the narrative and mechanics while enhancing emotional immersion.

The concept of 'video game values' proposed by Barr et al. focuses the role of interfaces in mediating gameplay through systems that dictate player behaviour. These values are expressed through mechanics, aesthetics, and narrative, with interfaces often acting as the link between the player and the game's intended experience. For instance, the design of a survival game interface may restrict information to the player, heightening a sense of vulnerability and aligning with the thematic goals of the game world. This contrasts sharply with interfaces in productivity-focused HCI, which prioritise transparency and clarity.

Furthermore, the integration of narrative and gameplay in video games is a distinguishing feature of game-oriented HCI. Interfaces serve not only functional purposes but also narrative ones, shaping how players perceive and interact with the game world. A well-designed interface can seamlessly integrate story elements, guiding players through both embedded narratives and emergent storytelling opportunities. This aligns with the work of Jenkins, who identifies the interplay between mechanics and narrative as central to creating meaningful game experiences (Jenkins, 2004).

The application of HCI principles to video game design also highlights the importance of player experience as a central metric. Barr et al. argue that heuristic evaluations and usability testing must adapt to the unique demands of games, considering not only technical usability but also emotional and narrative engagement. For example, testing a stealth game may focus on whether players feel

tension and satisfaction during gameplay rather than merely assessing the efficiency of controls. This focus on the player experience positions HCI as a critical tool for understanding how games evoke emotions, convey meaning, and foster engagement.

In summary, the study of HCI in video games underscores its distinct priorities and challenges, bridging the gap between functionality and artistry. By examining interfaces as mediators of gameplay, narrative, and player experience, HCI research provides valuable insights into how games create engaging and immersive experiences for players.

2.6.2 Player Communication with Intelligent Game Characters

The interaction between players and intelligent game characters using natural language provides a unique lens through which HCI in games can be examined. Allison et al. investigate how players craft natural language messages when interacting with AI-driven game characters, revealing critical insights into player behaviour, expectations, and the challenges of designing intuitive and engaging communication systems. (Allison, et al., 2018)

Allison et al. identify player expectations as a central factor shaping how they interact with intelligent characters. Players often approach these interactions with assumptions derived from prior experiences with natural language systems, such as virtual assistants or text-based games. These expectations influence their communication strategies, with players adopting either exploratory or functional approaches to test the system's capabilities or achieve specific gameplay objectives. This aligns with Barr et al.'s observation that interfaces in games must mediate both usability and engagement, balancing player intuition with the need to sustain narrative immersion (Barr, et al., 2007).

The study also highlights how the design of communication interfaces impacts player behaviour. For example, players are more likely to experiment with complex or humorous inputs when the system's affordances suggest a high degree of responsiveness and flexibility. This mirrors the findings of Brusk and Björk, who emphasised the importance of mixed-initiative dialogues in fostering organic and dynamic interactions (Brusk & Björk, 2009). Intelligent characters that can redirect conversations or adapt to unexpected inputs enhance both player immersion and the believability of NPCs.

Despite its potential, natural language interfaces in games face significant challenges. Allison et al. note that miscommunication often arises when the AI fails to interpret player inputs accurately, leading to frustration and a breakdown in immersion. This issue echoes the Eliza Effect identified by Wardrip-Fruin, where systems appear intelligent but fail to sustain meaningful interactions (Wardrip-Fruin, 2012). To mitigate these challenges, designers must prioritise transparency in system capabilities, providing players with subtle cues about what types of inputs the system can process effectively.

Furthermore, Allison et al. discuss the importance of managing player expectations through diegetic design elements. For example, framing the AI character as an eccentric or limited being within the narrative can contextualise its conversational limitations, turning potential frustrations into moments of humour or engagement. This approach aligns with Lessard's findings on how diegetic constraints in NLI can manage player expectations and preserve immersion (Lessard, 2016).

The study by Allison et al. provides several implications for HCI design in video games, particularly in crafting interfaces that facilitate seamless player-character communication:

- **Player Modelling**
  By understanding how players approach natural language communication, designers can adapt AI behaviours to align with individual playstyles and preferences, enhancing engagement and satisfaction.
- **Iterative Testing**
  The importance of testing natural language systems in diverse contexts is emphasised to refine their responsiveness and coherence. This recommendation resonates with Barr et al.'s proposal on adapting heuristic evaluations and user testing for game-specific challenges (Barr, et al., 2007).
- **Integration with Narrative Design**
  Natural language systems must not only function as interaction tools but also integrate meaningfully into the game's narrative, enriching player immersion through dynamic storytelling opportunities.

The insights from this study reinforce the importance of HCI as a mediator between narrative, gameplay, and player experience. By examining how players communicate

with intelligent characters, Allison et al. highlight the intersection of interface design and emergent storytelling, themes echoed in prior research on NLI and gameplay values (Lessard, 2016; Brusk & Björk, 2009). The findings also reinforce the role of adaptive systems in fostering player agency and conversational freedom, aligning with Bontchev's exploration of dynamic player modelling and procedural adaptability (Bontchev, 2016).

2.6.3 Voice Interaction in Games and Conversational Interfaces

Voice interaction provides another perspective through which natural language can influence HCI, allowing users to communicate with a system through speech rather than relying exclusively on traditional physical or written input methods. Within games, this interaction can range from simple voice commands to more developed spoken conversations with NPCs. Allison et al. distinguish voice interaction as a broad category that includes any vocal input processed by a system, while spoken interaction specifically relies on recognised words and language (Allison, et al., 2018). This distinction is important for the present research, which focuses on spoken natural language rather than non-verbal vocal inputs such as pitch, volume, or other sounds. Allison et al.'s survey of 449 video games and 22 audio games demonstrates that voice has been explored across a wide range of game genres and interaction patterns, but also identifies speech recognition and the social awkwardness of speaking to a game as persistent design challenges.

This reflects the broader HCI principles discussed by Barr et al., where an interaction method cannot be evaluated solely according to its functional usability but must also be considered in relation to the intended player experience. Voice interaction may provide an intuitive method of input because speech is familiar in everyday communication, but this does not necessarily mean that speaking aloud during gameplay will always feel natural. Allison et al. note that voice interactions can create discomfort when the required speech conflicts with the player's role or the context established by the game. This reinforces the importance of diegetic framing already identified by Lessard, where the narrative context of an interaction can help players understand both why they are communicating with a system and what forms of communication are appropriate.

Earlier research into spoken interaction in games demonstrates both the potential of the approach and its technical limitations. Boye et al. developed a conversational game in which players interacted with embodied fairy-tale characters in a 3D

environment through spoken dialogue (Boye, et al., 2006). Players relied on these characters to gather information and perform actions within the game world, making spoken communication a primary means of interaction rather than an additional control method. The study highlights how natural speech can connect interaction with character communication and gameplay objectives, but also demonstrates the difficulty of reliably interpreting spontaneous spoken input. Speech recognition represented a significant technical constraint, requiring additional language processing to interpret incomplete, disfluent, or incorrectly recognised speech.

The challenge identified by Boye et al. also illustrates a tension that remains relevant to NLI design. Players can be given the impression that they are free to communicate naturally, while the system itself may only be capable of reliably interpreting a more restricted range of language. This relates closely to the expectation management discussed previously by Allison et al., where players adapt their communication according to how capable they perceive an intelligent character to be. It also connects with Wardrip-Fruin's discussion of the Eliza Effect, where an interaction can encourage users to attribute greater understanding to a system than it can consistently sustain. In voice interaction, failures in recognition add another point at which this perceived intelligence can break down, as the system must first accurately identify what the player has said before interpreting its intended meaning.

More recent research suggests that improvements in speech recognition and NLP have renewed interest in spoken interaction with NPCs. Zargham et al. examine the potential of speech interaction in single-player games through a survey of video game experts and interviews with researchers specialising in conversational interfaces and game user research (Zargham, et al., 2025). Participants identified potential benefits relating to immersion, engagement, entertainment, and accessibility, particularly where speech enables players to communicate directly with NPCs. However, the study also highlights limitations beyond the accuracy of the technology itself, including privacy, the physical environment in which a game is played, and the social implications of speaking aloud to a game. These findings demonstrate that effective voice interaction depends upon both the conversational capabilities of the system and the wider context in which that interaction takes place.

These considerations are also seen outside of gaming. Nass and Brave examine voice as a form of HCI and argue that users respond socially to computer-generated voices in ways comparable to responses to other humans (Nass & Brave, 2005).

Characteristics such as personality, emotion, and the presentation of a voice can therefore influence how a user interprets and responds to a system. This is particularly relevant to NPC interaction, where voice is not only a method of presenting information, but also a way of contributing to the perceived personality and believability of a character. Within an RPG, the effectiveness of spoken NLI may consequently depend on the relationship between what an NPC says, how that dialogue is communicated, and whether these elements remain consistent with the character and wider narrative context.

Research into commercial conversational agents further demonstrates the importance of managing user expectations. Luger and Sellen investigated everyday interactions with conversational agents and found that user expectations were frequently misaligned with the actual capabilities of the systems (Luger & Sellen, 2016). Their participants often found it difficult to understand what a conversational agent could reliably achieve, producing a gap between the apparent simplicity of speaking naturally and the restrictions placed on successful interaction. This finding closely aligns with the problems identified within game-based NLI. As discussed by Allison et al. and Lessard, greater perceived conversational freedom can encourage players to experiment with language, but it can also increase the likelihood that they exceed the intended capabilities of the system.

Porcheron et al. extend this understanding by examining the use of voice interfaces within everyday social environments (Porcheron, et al., 2018). Through the study of Amazon Echo devices within participants' homes, they demonstrate that interaction with a voice assistant takes place alongside other conversations and activities rather than existing as an isolated exchange between a user and a computer. Voice interaction must therefore be considered in relation to the physical and social environment surrounding the user. This offers an important distinction from written NLI, where interaction can generally remain private between the user and the interface. Spoken interaction requires the player to vocalise their input, introducing considerations around privacy, comfort, environmental noise, and the presence of other people.

Taken together, research across gaming and non-gaming contexts demonstrates that voice interaction provides opportunities for more direct and socially recognisable communication with computer systems, but introduces additional HCI considerations beyond those associated with written input. Accuracy and language interpretation

remain important, but player expectations, social context, privacy, character presentation, and the relationship between voice interaction and the game world also influence the resulting experience. These findings support the consideration of spoken and written NLI as related but distinct methods of player-NPC communication. Within narrative-driven games, spoken interaction may strengthen the immediacy and social qualities of NPC communication, while its effectiveness remains dependent on the system's ability to recognise player input and respond in a way that remains contextually and narratively appropriate.

2.6.4 Player Communication through Free-Form Dialogue in RPGs

Cheng and Graham explore the potential of free-form dialogue in computer role-playing games (CRPGs) through their prototype *Persiflage*, which allows players to interact with NPCs using unrestricted natural language (Cheng & Graham, 2019). The authors position free-form dialogue as an alternative to the rigid constraints of traditional menu-driven systems, arguing that it fosters greater player agency and narrative freedom. While the study provides valuable insights into player behaviour and the role of NLI in narrative design, its approach raises questions about scalability, narrative coherence, and technological feasibility in real-world applications.

The study reiterates Lessard's point on the limitations of pre-authored dialogue trees, which often restrict players to selecting from a finite set of responses (Lessard, 2016). Cheng and Graham argue that free-form dialogue can overcome these constraints by enabling players to craft their own inputs, resulting in dynamic and personalised conversations. This aligns with Lessard's emphasis on the role of NLI in fostering emergent storytelling, where player contributions shape narrative outcomes in unique ways. However, while *Persiflage* shows the narrative strength of free-form dialogue, the absence of automation in the NPC responses limits the applicability of these findings to more scalable systems, instead relying on human orchestrators. The study does not address the complexities of designing automated NPCs capable of interpreting and responding to such diverse player inputs with consistency.

Cheng and Graham identify emergent storytelling as a central strength of free-form dialogue systems, where narrative evolves organically based on player input. Players in *Persiflage* were observed blending humour, cultural references, and strategic dialogue to navigate in-game situations, resulting in creative and

personalised story arcs. This echoes Jenkins's theory of embedded and emergent narratives, where players engage in storytelling both within pre-authored contexts and through unscripted interactions (Jenkins, 2004).

However, the reliance on human operators in *Persiflage* raises concerns about the reproducibility of these emergent narratives in RPGs with NPC systems driven by AI. For example, Wardrip-Fruin's critique of the Eliza Effect suggests that automated systems often struggle to sustain the illusion of intelligence over prolonged interactions, potentially undermining the emergent qualities celebrated in *Persiflage* (Wardrip-Fruin, 2012). While the prototype succeeds in showcasing the creative potential of player-driven dialogue, its findings offer limited insight into the challenges of maintaining narrative coherence in automated systems.

One of the critical challenges not addressed by Cheng and Graham (2019) is the feasibility of implementing free-form dialogue at scale in RPGs. The improvisational flexibility demonstrated in *Persiflage* relied on human facilitators who interpreted player inputs and replied with contextually appropriate NPC responses. While this approach allowed for ample and varied interactions, it bypasses the computational and design complexities associated with fully automated systems. Brusk and Björk emphasise that adaptive dialogue systems must balance freedom with coherence, ensuring that NPCs remain believably anchored within the narrative world (Brusk & Björk, 2009). Without addressing the mechanisms for achieving this balance in automated systems, *Persiflage* provides limited guidance for developers seeking to implement free-form dialogue in commercial RPGs.

Additionally, the study does not adequately explore the implications of player behaviour on system design. Players in *Persiflage* often pushed the boundaries of the game's narrative, introducing modern slang and pop-culture references into its medieval setting. While this creativity highlights the flexibility of free-form dialogue, it also underscores the risk of players breaking narrative immersion, particularly in games that aim for thematic consistency. As suggested by Lessard, diegetic constraints could mitigate these issues by framing NPCs as characters with limited understanding or eccentric behaviours, but Cheng and Graham do not explore such solutions.

The methodology employed in the study provides a strong foundation for understanding player behaviour and engagement with free-form dialogue.

Observational data collected during gameplay sessions offers valuable insights into how players interact with NPCs in open-ended systems. However, the lack of an automated dialogue system limits the broader applicability of the findings, especially in a single-player gameplay experience. While the authors propose that free-form dialogue enhances immersion and agency, they do not evaluate how these benefits might translate into systems constrained by current technological limitations, such as NLP models.

Cheng and Graham make a significant contribution to the study of NLI in RPGs by demonstrating the creative potential of free-form dialogue systems. Their findings highlight how open-ended conversations can foster emergent storytelling, increase player agency, and break the constraints of traditional dialogue trees. However, the study's reliance on human operators and its focus on player behaviour rather than system design limits its relevance for scalable implementations. Further research is needed to explore how automated systems can achieve similar levels of narrative depth while addressing the challenges of coherence, consistency, and computational feasibility.

2.7 Literature Review: Human-Computer Interaction - Key Takeaways

This review explores the principles and applications of HCI in video games, focusing on how player interaction, interface design, and emergent technologies shape engagement and narrative immersion. The findings highlight several critical themes relevant to the integration of NLI-driven systems for RPGs:

1. **The Role of HCI in Game Design**:
    - HCI in video games differs from traditional applications of the field by prioritising engagement, challenge, and immersion over pure usability. Interfaces in games often function as mediators of narrative and gameplay, influencing player perception and behaviour (Barr, et al., 2007).
    - Unlike productivity-focused software, game interfaces deliberately introduce friction, complexity, and constraints to create meaningful and enjoyable experiences. This highlights the interplay between mechanical functionality and thematic narrative goals in game design.

2. **Communication Systems and Player Interaction**:
    - NLI introduces new possibilities for HCI by revising player input and NPC responses into dynamic, personalised interactions. Free-form dialogue systems, such as those explored by Cheng and Graham, demonstrate how conversational freedom fosters emergent storytelling and enhances player agency (Cheng & Graham, 2019).
    - NLI systems present significant challenges, such as managing miscommunication and sustaining the believability of NPC responses. Strategies like diegetic constraints and player expectation management are crucial for preserving immersion in NLI-driven games.
    - Spoken NLI introduces additional considerations beyond written interaction, particularly around speech recognition accuracy, player comfort, privacy, and the environment in which interaction takes place. Research across gaming and non-gaming conversational systems highlights how these factors can influence the effectiveness and perceived naturalness of voice interaction (Boye, et al., 2006; Porcheron, et al., 2018; Zargham, et al., 2025).
3. **Interface Design and Player Experience**:
    - Game interfaces are not merely functional tools but integral components of the player experience. Studies such as Allison et al. emphasise the importance of transparent and intuitive input systems, particularly in the context of written and spoken natural language interfaces (Allison, et al., 2018). Voice interaction also introduces a stronger social element, where player expectations can be influenced by previous experiences with conversational agents and everyday speech technologies (Luger & Sellen, 2016).
    - Feedback mechanisms, such as NPC behaviours and narrative cues, play a critical role in maintaining player engagement. These outputs must align with player expectations and reinforce the narrative context, ensuring that interactions feel meaningful and coherent.
4. **Technological Challenges and Opportunities**:

- The integration of cutting-edge technologies, such as modern LLMs and adaptive systems, presents both opportunities and limitations for HCI in games. While LLMs enable more sophisticated and contextually strong NPC interactions, their successful implementation depends on addressing challenges of scalability, coherence, and computational demand (Bontchev, 2016; Wardrip-Fruin, 2012). For spoken interaction, this also includes the reliability of speech recognition before the player's intended meaning can be interpreted.
- Iterative playtesting and player modelling are essential tools for refining HCI systems in games, ensuring that they meet the diverse needs and expectations of NLI for players.

5. **Emerging Themes in RPG Design**:
    - HCI research highlights the potential of interactive systems to enhance narrative design in RPGs. By allowing players to influence storylines through free-form dialogue and adaptive NPC responses, HCI supports the creation of immersive, player-driven narratives (Cheng & Graham, 2019; Lessard, 2016).
    - The interplay between interface design, player agency, and narrative coherence emerges as a central challenge for RPG development, requiring innovative approaches to balance freedom with structure.

2.8 Questionnaire Design and Player-Experience Evaluation

Before moving forward, it's important to establish that questionnaires provide a structured method for collecting participant perceptions and experiences, making them particularly relevant to research concerned with player experience. As discussed by Barr et al., HCI within video games extends beyond conventional measures of usability because games are also concerned with engagement, challenge, emotional response, and immersion. Many of these qualities are dependent on the player's perception of an experience rather than an independently observable outcome. Questionnaire-based evaluation therefore provides one method of examining how players interpret and respond to particular aspects of a game.

The design of a questionnaire should remain closely connected to the objectives and constructs being investigated. Artino et al. describe questionnaire development as a

process that begins with defining the areas to be measured, reviewing the relevant literature and existing instruments, and developing questions that appropriately address those areas (Artino Jr, et al., 2014). Dillman et al. similarly identify question wording, ordering, response options, and the distinction between open and closed questions as important considerations when constructing questionnaires (Dillman, et al., 2014). These principles are particularly relevant where an investigation considers several connected elements of an experience rather than attempting to measure a single variable.

Combining structured and open questions provides different forms of evidence within the same evaluation. Structured response options allow patterns to be identified and compared between participants, while open-text questions provide opportunities for participants to explain their responses or introduce observations that were not anticipated by the researcher. Papachroni and MacIntosh highlight the value of qualitative responses where greater depth is required to understand participant perspectives (Papachroni & MacIntosh, 2014). Within player-experience research, this combination can therefore identify whether an aspect of a game was perceived positively or negatively while also providing further context concerning why that perception occurred.

Ordered rating scales provide an established means of capturing the direction and strength of participant attitudes. Likert's original work established the broader principle of measuring attitudes through ordered response categories (Likert, 1932). However, the number and structure of available responses can influence the resulting data. Garland's comparison of rating scales with and without a midpoint found that removing the neutral category can reduce the opportunity for respondents to select a midpoint, but may also affect the distribution of responses (Garland, 1991). A forced-choice scale should therefore not be treated as inherently more accurate. Instead, it can be used where the research requires participants to indicate the direction of their evaluation rather than selecting a neutral position.

Questionnaire-based evaluation is also established within game-user research. The Game Experience Questionnaire (GEQ) provides an example of a post-play self-report instrument designed to investigate dimensions of digital game experiences including immersion, flow, competence, affect, tension, and challenge (IJsselsteijn, et al., 2013). However, the appropriateness of existing instruments depends upon the particular research problem being investigated. Law et al. identify limitations in

the reporting and validation of the GEQ, demonstrating the importance of considering the suitability of an established instrument rather than assuming that it is appropriate for every form of game evaluation (Law, et al., 2018).

The present research requires participant responses concerning areas that extend beyond general game experience, including NPC interaction, narrative agency, conversational freedom, realism, NLI accuracy, spoken and written interaction, immersion, and intuitiveness. A bespoke questionnaire is therefore appropriate rather than directly adopting an existing player-experience instrument. Its construction is informed by the areas established through the literature review and is developed further through the pilot study presented in Chapter 3. The resulting approach combines structured ratings with open-text responses so that measurable patterns can be considered alongside participant explanations. Chapter 4 subsequently describes how this approach was refined for the main evaluation of the research prototype.

2.9 Summary

This chapter has examined the integration of narrative design, NLI, and HCI within RPGs, identifying their combined relevance to player experience and narrative engagement. Central to this exploration is the transformative role of NLI-driven systems in enabling more dynamic and personalised communication between players and NPCs. The review has highlighted that NPCs, far from being static or functional elements, act as active narrative agents with the capabilities to foster emergent storytelling and enhance the player's sense of agency. This capacity is particularly significant for RPGs, where character-driven narratives and player freedom are integral to the experience.

The review also considered the historical development of NLI within games. Text-based adventures and parser-driven interactive fiction provide an important precedent for allowing players to construct their own written inputs rather than selecting from predefined options. While these systems offered expressive freedom, their reliance on restricted language and recognisable command structures also showed limitations in how effectively player intent could be interpreted. Contemporary NLI builds upon these earlier interaction models through developments in NLP that allow a broader range of written and spoken input to be processed.

Throughout the review, several key themes emerged. First, NLI offers players greater conversational freedom, allowing them to shape NPC interactions and contribute to narrative development in ways that traditional menu-driven systems cannot. This creates opportunities for emergent storytelling but also introduces challenges around maintaining narrative coherence and responding appropriately to unpredictable player input. Second, NPCs empowered by NLI systems can contribute to both narrative design and gameplay by delivering tasks, instructions, and contextual information while responding more flexibly to player communication.

The HCI literature further demonstrates that the effectiveness of NLI depends upon more than the underlying language system. Written and spoken interaction each introduce different considerations for interface design, player expectations, and usability. Research across both gaming and non-gaming conversational systems also demonstrates that previous experiences with technologies such as virtual assistants can influence the expectations users bring to NLI.

Finally, the review considered questionnaire design and player-experience evaluation as a methodological basis for investigating these experiences. Questionnaire-based approaches provide a means of combining structured participant responses with qualitative explanations, allowing patterns to be considered alongside the reasons underlying them. The literature also demonstrates the established use of post-play self-report measures within game-user research while highlighting the importance of selecting or developing questions that are appropriate to the specific constructs being investigated. These findings inform the subsequent pilot study in Chapter 3 and evaluation methodology in Chapter 4.

The insights from this review establish the foundation for the following research questions, which guide the overall focus of this PhD:

- How do players perceive and engage with an NLI-driven RPG, and what factors influence their enjoyment, interest, and willingness to recommend such a design?
- How do NPC interactions driven by natural language systems influence player perceptions of narrative agency, realism, and freedom in RPGs?

- How do players evaluate the effectiveness and realism of NLI systems in video game environments, particularly in comparison to virtual assistants and other NLI-based games?
- How does the use of NLI systems, supported by written or spoken input, influence player immersion, intuitiveness, and observations of innovation in video game design?

Together, these questions address the areas identified through the literature review concerning contemporary NLI within RPGs, including player-NPC communication, narrative agency, spoken and written interaction, and player experience.

The next chapter introduces the pilot study, which provides a preliminary exploration of these areas and gathers participant perspectives that are subsequently used to refine the research methodology and design of the main experiment.

Chapter 03: Pilot Study

3.1 Introduction

This pilot study serves as a precursor to the development of the research methodology, seeking valuable insights into the interaction patterns and narrative perceptions of modern video game players. Building upon the findings of the literature review, which identified key gaps in existing knowledge, this pilot study aims to provide an early exploration of these areas that will inform the subsequent design of the research experiment.

The first section of this chapter provides the motivation behind conducting a pilot study and underscores its significance in complementing the insights drawn by the literature review. By highlighting the motivations driving the pilot study, this section sets the stage for understanding the pilot study's role in advancing the greater body of research.

Subsequently, the second section defines the foundational principles of the pilot study, including its approach, validation strategies, and the tools employed for data collection. This section outlines the execution of the pilot study and demonstrates the methodological rigour applied throughout.

The third section reveals the construction of the pilot questionnaire, outlining the formulation of questions and explaining their significance in gathering preliminary evidence. By defining the scope and purpose of the questionnaire, this section establishes the framework for data collection and analysis.

Following this, the fourth section presents an analysis of the responses obtained from the study contributors. This evaluation considers the pilot-study responses alongside insights drawn from the literature review and identifies findings relevant to the development of the subsequent experimental methodology.

The fifth section reiterates the key findings of the pilot study and contextualises its contributions within the greater research body. By incorporating the key insights obtained from the pilot study, this section emphasises its significance in shaping the direction of the later research experiment.

Section six evaluates the findings of the pilot study in relation to the themes explored in the literature review. By focusing on the three key areas of game narrative design, NLI, and HCI, this section identifies alignments, contrasts, and opportunities for

innovation between the study results and existing research. It highlights the pilot study's contribution to addressing gaps in the literature and provides a foundation for advancing the integration of NLI systems and emergent storytelling frameworks in future research.

Finally, the chapter concludes with a summary that encapsulates the key points discussed and highlights any additional considerations that will be crucial for advancing into the design and development stage. This section serves as a bridge to the subsequent evaluation methodology chapter, which integrates insights from both the literature review and pilot study results.

3.2 Rationale of the Pilot Study

The overall investigation interlinks research for both games design approaches and Human-Computer Interaction (HCI) standards that exist to serve the games industry. Because of this, there is an expected nature of the participants that will be targeted for testing the objectives of this investigation, that nature being individuals with experience in playing video games. Therefore, this pilot study was performed to build on the results of the literature review to aid in the design and production of the methodology. In turn, this will boost the relevance of the data so that it is most efficiently useful.

3.3 Justifications

When deciding which data collection platform to use for collating responses, it was important to select one that will extract accurate results from the participants in the most intuitive and straightforward way. There are multiple solutions that are sufficient enough to match this practicality, and so Microsoft Forms was selected due to the platform’s ability to provide the basic requirements of the functionality. For example, intuitive questionnaire presentation, and a range of data collection tools like rating scales, text input boxes, and multiple-choice entries. Additionally, Microsoft Forms is already a familiar platform amongst the largest expected set of survey participants. The setup process on Forms also includes a predicted completion time, which is useful for communicating to potential participants who may be deterred from contributing if the expected survey completion time is too long.

The pilot survey was primarily directed towards student and staff cohorts of the University of Staffordshire’s Games Development department, in accordance with the ethics procedures of the university that was applied and adhered to. This is due

to the ready availability of a large student body who is relatively familiar with the area in which the research area is based, and the researcher's ease of access to its cohorts. The request for participation was opt-in only and distributed to platforms that only these cohorts could access. The first method of outreach focused on emailing the relevant bodies via module class announcements that would be received by both students and staff connected to those modules. The second method involved sharing a link to the survey on a private student Facebook group that any student or staff member could see if they were followers. Furthermore, the study was then shared on the Reddit website with the prerequisite that participants had some knowledge of video game design and gameplay. The specific subreddit forums invited to participate included 'r/SampleSize', 'r/gamedesign', and 'r/PhD'.

As established in section 2.8 of chapter 2, questionnaire-based evaluation provides an opportunity to combine structured participant responses with more detailed qualitative feedback. The pilot study therefore adopts a mixed-methods questionnaire using ordered rating questions, multiple-choice responses, and open-text fields. Structured responses provide comparable data concerning participant attitudes and experiences, while open fields allow contributors to explain their reasoning and identify considerations that may not have been anticipated through predetermined response options (Papachroni & MacIntosh, 2014).

The questionnaire is organised around the principal areas identified through the literature review: game narrative design, natural language interaction, and human-computer interaction. This allows the pilot study to gather preliminary evidence concerning each area before the methodology for the main experiment is finalised. Where four-point ordered rating scales are used, a neutral midpoint is omitted so that participants indicate the direction of their evaluation. This forced-choice structure is used as a design decision rather than an assumption that the resulting responses are inherently more accurate (Garland, 1991). The findings produced through this combination of structured and open responses are subsequently used to inform the design and evaluation of the main research experiment.

3.4 Questions

3.4.1 Section 01 – Preliminary Questions

No.	Question	Answers

1.	Do you play video games?	Yes
		No
2.	If yes, how often do you play per week?	0 to 4 hours
		4 to 8 hours
		8 to 12 hours
		12 to 16 hours
		16 to 20 hours
		20+ hours
3.	List the game genres you mostly play.	(Open field)

(Table 3.01: Preliminary questions asked in pilot study)

This section is outlined as a comfortable opener to ease the participant in with non-identifiable questions about their gameplay habits. Question 1 is intended to be a catch-all for irrelevant responses that can be filtered out during analysis. Question 2 provides an indication of how often the participant plays video games to help roughly determine how well-versed they are in game systems. Question 3 also helps to parse the participants for responses that would be more closely aligned with the pre-planned methodology.

3.4.2 Section 02 – Game Design

No.	Question	Answers
1.	Which of the following game genres do you consider have the most complete storylines?	Action
		Action-Adventure
		Adventure
		Role-Playing Game (RPG)
		Simulation
		Strategy
		Sports
2.	What game mechanics do you think help a player to advance a narrative?	(Open field)
3.	For storytelling within a game, what do you believe functions as an important narrative device?	(Open field)
4.		Very Important
		Somewhat Important

	In most cases, how important do you believe Non-Playable Characters (NPCs) are to a successful narrative experience?	Hardly Important Not Important at All
5.	Regarding narrative context, how important do you believe that information be delivered to the player via NPCs?	Very Important Somewhat Important Hardly Important Not Important at All
6.	In a game with NPC interaction, how important is it to you that variation exists for NPC personalities? (E.g. their motivations, fears, and general idiosyncrasies)	Very Important Somewhat Important Hardly Important Not Important at All
7.	By improving an NPC's access to information in a game, how do you think they could perform better from a narrative point of view? (For example, what could they do with enhanced scripting of simulated Aristotelian senses of sight, hearing, taste, smell, or touch?)	(Open field)
8.	How do you feel interacting with an NPC compares to real life conversations with other humans?	(Open field)

(Table 3.02: Games design questions asked in pilot study)

This section applies the focus to game design considerations, fetching answers that pertain to the participant's experience with playing games and then gauging their views on how gameplay could evolve. The inclusion of this section serves to provide insight that directly links to the aims of the overall research project, by specifically gauging how relative the greater investigation is against the related industry's consumer expectations. The questions themselves are drawn from the results of the literature review and are intended to underpin the game design decisions that form the development of the methodology. This will reinforce the design of the overall research project's objective to develop a narrative genre-specific framework. The questions also seek confirmation of the deductions explored in the literature review, namely that NPCs with enhanced natural language interaction (NLI) qualities for dialogue can enhance the narrative experience of a game.

3.4.3 Section 03 – Natural Language Interaction

No.	Question	Answers
1.	Have you ever played a game that allowed you to interact using your own voice?	Yes
		Yes, but I never used the feature.
		No
2.	If you responded with yes, please describe these experiences. Otherwise, please describe your reasoning for either not using the feature, or not playing a game that included it.	(Open field)
3.	Have you ever used a voice assistant? (For example, Alexa, Siri, Google etc.)	Yes
		No
4.	If you responded with yes, please describe what you used the voice assistant for. Otherwise, please express your reasoning for not having used one.	(Open field)
5.	Considering how voice assistants are used, how do you think these interactions can translate successfully into a video game environment?	(Open field)
6.	What video game genre do you believe could benefit most from using voice interaction?	Action
		Action-Adventure
		Adventure
		Role-Playing Game (RPG)
		Simulation
		Strategy
		Sports

(Table 3.03: Natural language interaction questions asked in pilot study)

This section shifts the lens towards natural language interaction as the second field within the research project's multidisciplinary investigation. The questions explore the participant's current state of familiarity with NLI in common voice assistants and seeks observations on how the user may have experienced a crossover of an outdated technology integration with video games already. These questions and their

elaborations were again chosen to provide support for the literature review findings, but also to prepare additional points of measurement to the methodology.

3.4.4 Section 04 – Human-Computer Interaction

No.	Question	Answers
1.	Do you think the way humans and computer systems interact is a changing landscape?	Yes
		No
		Unsure
2.	Explain why you think this.	(Open field)
3.	Think about a **positive** human-computer interaction that you have experienced in video games, describe why this stands out to you.	(Open field)
4.	Think about a **negative** human-computer interaction that you have experienced in video games, describe why this stands out to you.	(Open field)
5.	How do you feel this negative experience could have been prevented?	(Open field)
6.	Please highlight which of the following peripherals you use when playing video games:	Mouse
		Keyboard
		Touchscreen
		Gamepad
		Microphone
		Speakers
		Headphones with built-in microphone
		Headphones without built-in microphone
		Monitor Display
		Virtual Reality Headset with built-in microphone

		Virtual Reality Headset without built-in microphone
		Virtual Reality Headset with built-in speakers
		Virtual Reality Headset without built-in speakers
7.	Have you ever used natural language in a video game to communicate with an NPC?	(Open field)
8.	If you responded with yes, please indicate the name of the game, whether this was through typed or spoken input, and describe the experience. Otherwise, please explain why not.	(Open field)

(Table 3.04: Human-computer interaction questions asked in pilot study)

This concluding section focuses on the final research field within the interdisciplinary investigation. These questions ask participants about their perceptions of HCI topics, with a specific application to their video gaming habits. Like the other sections, these questions bolster the highlighted literature review outcomes and target the participant for information regarding their natural gaming behaviours as a resource for planned replication within the methodology. This is because when studying for a potential narrative game design solution for industry approachability, it will be important that a measurable level of accessibility to a wider audience has been considered and designed for.

3.5 Results

The study was conducted over a period of ten days, from 25th October 2019 to 3rd November 2019. During this timeframe, participant responses were collected and analysed to identify emerging patterns in interaction behaviours and narrative perceptions. The controlled duration ensured a consistent data-gathering process while allowing for meaningful engagement with the questionnaire.

The sample size reached 66 completed user entries, with 1 set of participant's responses omitted due to answering 'no' to the first question and then repeatedly

answering that they don't play games, bringing the sample size down to 65. The collated results are collated into graphs and tables, as shown in Appendix 1A.

3.6 Participation Analysis

3.6.1 Section 01 – Preliminary Questions

Question 1, as previously mentioned, was implemented to create a digital filtration system that would help identify irrelevant results that do not provide any usable data for analysis. This worked to recognise, and consequently exclude, one entry within the overall data set, and the rest of the remaining data shows credible outcomes that can serve for examination, as shown in Figure 3.01 of Appendix 1A.

Figure 3.02 of Appendix 1A shows that question 2 had 27.69% of participants select the highest threshold, stating they play over 20 hours of video games, on average, per week. This is the highest presented option for this question, and in total 47.69% trended towards the higher end of the full scale of selectable options, ranging overall from 12 to over 20 hours per week. This shows that the sample size is roughly equal for how many users spend a lot of time playing games, versus those who do not. This suggests that the follow-up data is roughly an even spread of players that do not play much compared to those who play a lot, therefore the sample size offers a wide range of perspectives across the spectrum of gameplay familiarity.

Figure 3.03 of Appendix 1A shows that question 3 provided an open field for users to submit the types of games they identify with playing. The following table shows the top 10 most common results after the data has been cleaned up into information that is more observable:

Genre	Entries
Role-Playing Game	41
First-Person Shooter	23
Strategy	15
Adventure	12
Action	10
Puzzle	10
Action-Adventure	9
Third-Person Shooter	6
Sandbox	5

Platformer	5

(Table 3.05: List of genres played as indicated by participants)

As a result, out of 204 entries, the role-playing game (RPG) came out on top as the most clearly played genre at 20.10%. With first-person shooter (FPS) as the second most visibly played genre at 11.27%, and strategy at 7.35%. This is useful as the wider research identified RPGs as one of the leading candidates for further investigation, and the pilot-study responses provide additional support for this direction.

3.6.2 Section 02 – Game Design Questions

Figure 3.04 of Appendix 1B provided a multiple-choice question that identified what genres of games the participants consider having the most complete storylines. With 132 entries, nearly half of them corresponded that RPGs were the lead genre in this respect at 46.21%. This supports the literature review's projections and further solidifies the narrative-based direction for the larger research project which aims to develop narrative design solutions within an RPG framework.

Question 2 of Appendix 1B delved deeper into participant perspectives and encouraged them to share what gameplay mechanics they feel help a player advance a narrative, with the most common responses of the data cleaned up in Table 3.06:

Mechanics	Entries
Quests	12
NPC Interactions	12
Response to Player Choice	12
Dialogue	9
Writing	6

(Table 3.06: A library of mechanics believed by participants to advance a narrative)

The sample size revealed ninety-seven entries that contained a wide variety of viewpoints. The 3 most commonly usable suggested mechanics were quests, non-player character (NPC) interactions, and responses to player choice, all standing equally at 12.37%. Followed up by dialogue at 9.28% and the writing itself at 6.19%. Interestingly, most of these top responses are commonly linked systemically within the same narrative design pipeline. Furthermore, overall, there were many accounts

that can be linked to the idea of NPC interaction that stands as a key staple to narrative experiences. Therefore, building on how player interaction works in games reaffirms the importance of developing interactive solutions as discussed in the literature review.

Section 1B's Figure 3.06 drilled in on the narrative elements of games and asked users what they believe functions as an important narrative device for storytelling within a game. Table 3.07 shows this data organised in a more readable format:

Narrative Device	Entries
Environment	14
Dialogue	10
Lore	10
Discovery	10
Player Choice	8
Characters	7
Cutscenes	6

(Table 3.07: Narrative devices believed as important for video game storytelling)

As a result, 21.54% of the participant suggestions point at the environment as the most important narrative device for storytelling in games. Meanwhile, Dialogue, Lore, and Discovery elements were equally identified as the next most important elements, each standing at 15.38% of the data set. Followed by player choice at 12.31%, the characters at 10.77%, and cutscenes at 9.23%. The responses show elements like dialogue and characters are at the forefront of the participant's experience, but considering one cannot exist without the other, these equate to 26.15% of the total results. This is positive affirmation for the literature review, which highlights that these should be key considerations in an RPG that focuses on NLI as part of its narrative design. Additionally, discovery and environmental elements were also reported as important to players, providing a further consideration to take forward into the methodology design.

Figure 3.07 shows that, coupled together, 95.38% of the study's contributors lean towards a consensus that NPCs are important to a successful narrative experience. This is made up of 63.08% of participants feeling that NPCs are very important in this regard, whilst 32.31% feel NPCs are somewhat important. A minority response of 4.62% of participants indicated that NPCs were hardly important, while no

participants selected that NPCs were not important at all. This data point highlights the literature review's findings that characters are important for game narratives, and therefore building on their interactive capability is justified.

Question 5 of section 1B follows up with results that show 27.69% of participants deem it very important that NPCs are the method in which information gets delivered to the player within a narrative context. This is followed by 60% of the contributors stating they believe this delivery approach is somewhat important, whilst only 12.31% believe it to be hardly important, and 0% think it's not important at all. In total, all players believe there is some level of importance to this narrative design technique, with another observable trend that tilts 87.69% of the results towards NPCs being important in some impactful way. Once again, the pilot study responses here reinforce the findings from the literature review.

Looking at the narrative design of NPCs, Figure 3.09 reveals that 95.38% of participants skew towards feeling it is important that variation exists across NPC personalities, and only 4.62% feeling it is not important. This further breaks down to 81.54% of results aligning strongly with this being a high factor, indicating that the methodology should consider alternative personality traits within incorporated NPCs.

For section 1B's question 7, participants were asked how they believe increasing NPCs access to information could help NPCs perform better in from a narrative perspective. An example was provided on enhanced scripting for Aristotelian senses of sight, hearing, taste, smell, or touch. The following table shows the data cleaned up into readable categories that represent the effects that contributors believe this increase in information will result in:

Increased Information Result	Entries
Realistic Reactions	33
Improved Dialogue	12
Better Storytelling	8
More Immersive	8
Increased Independence	6
Believable World	4
Enhanced Narrative Development	4
Reduced layer Focus	1
Less Realistic	1

(Table 3.08: Perceived effects on narrative by increasing NPC access to information)

As a result, 42.86% shows that contributors consider this approach would create more realistic reactions for NPC interactions over any other answer. This is the largest reported answer from the list of responses and is followed by 15.58% of participants suggesting that they feel improved access to information would improve the dialogue with NPCs itself. Overall, 97.40% responded positively to the concept proposed by the question and therefore supports the need set out in the literature review for advancing player interaction systems in games.

Question 8 explores how survey participants feel interacting with NPCs compares to real life conversations with other humans. By analysing the answers shown in Figure 3.11, the data illustrates that most responses relate to similar notions that NPCs currently feel either too limited, scripted, robotic, repetitive, or unrealistic. Whereas the least common replies are a mix between NPCs being better than humans as they are more structured, less stressful to interact with, and easier to understand. The second most associated answer is that NPCs do not compare since humans have much more conversational freedom to drive the conversation wherever they want to. Finally, the third most common response states that the difference between conversations with NPCs and humans depends on certain factors, such as the genre of the game, or function of the NPC. Overall, most of the data responses for this question show a focus on the fact that there is a stark perceivable difference between the two conversational entities. Therefore, the results of the question support the literature review's findings that current narrative design techniques for NPC interaction are outdated and should be experimented with new NLI procedures that use more conversation freedom in conversations with NPCs.

3.6.3 Section 03 – Natural Language Interaction Questions

Figure 3.12 of section 1C queried research participants on whether they had ever played a game that allowed them to interact using their own voice. 58.46% of responses expressed that these players had never played a game with this functionality, while 41.54% stated that they had. However, that latter percentage breaks down further into 62.96% affirming they had actively used this functionality, with the remaining 37.04% stating they had played a game that provided them the ability to, but they did not utilise it.

The pilot study then followed up with question 2 of the section, asking users who had played a game that offered voice interaction to describe their experiences. But if the participant had stated otherwise, they were asked what their reasoning was for not using the feature or not playing a game that included it. Figure 3.13 exhibits the detailed answers received, and the largest volume of data stands at 32.53% indicating the participants were not familiar with any games that included voice interaction as a feature. Of that percentage, 25.93% of players stated that they would be interested in games with voice interaction mechanics, whilst 11.11% were apprehensive because they felt the technology is not at a stage where this can be dependable. The remaining 62.96% of answers pointed to the users simply not being aware of games with this functionality.

Further responses to question 2 identify 28.92% of responses detailing that these participants had played games with voice interaction. Of that percentage, 25% of players reported that they found these experiences to be useful, interesting, fun, and engaging. Referring to games such as *Alien Isolation* (Creative Assembly, 2014), *Binary Domain* (Ryu Ga Gotoku Studio, 2012), *VROARRR* (Penninck, et al., 2017), and *Hey You, Pikachu!* (Ambrella, 1998-2000). However, 62.50% found that their experiences with voice interaction in games were frustrating. Reasons stated for this included their experiences barely working due to suffering from factors such as too much technical delay from the natural language processing, NPCs misinterpreting input, and limited scripting for conversational understanding.

Additionally, in response to question 2, 14.46% of participants reported that they had no interest in utilising voice interaction as a mechanical feature within a game. Overall, the spread of answers for the question shows a wide range of experiences, with most of them leaning towards adverse encounters due to the technology at the time. This reinforces the earlier chapter's literature review that newer technology solutions need investigating. This is especially interesting when coupled with the number of players that have already found the outdated solutions to be positive or are interested to yet play games with voice interaction.

Figure 3.14 for question 3 reveals the amount of study participants who have actively used voice assistants, with 66.15% declaring they had, whilst 33.85% said that they had not. This data shows that a significant majority of players have experimented with modern day voice interaction devices that rely on NLI. This is higher than the previous questions that queried voice interaction uses in games, and therefore

supports the notion that an updated game design utilising similar technology would yield an up-to-date state of knowledge as outlined in the greater research body.

Question 4 follows up on this subject by further inquiring what participants have used voice assistants for, or their reasoning for not having used one yet. The following table shows the cleaned-up data from Figure 3.15 where participants highlighted the activities they have performed using a voice assistant:

Voice Assistant Activities	Entries
Setting Timers, Alarms, Reminders, or Events	17
Asking or Searching General Questions	13
Controlling Music	13
Weather Inquiries	8
Hands Free During Other Activities	7
General Usage or Experimentation	4
Utilising Map Services	3
Controlling Other Smart Devices	2
Communicating With Contacts	2
Making Notes	1
Playing Games	1
Checking News	1
All Kinds of Usage	1

(Table 3.09: List of activities that voice assistants have been used for)

As a result, the sample size showed a mix of sixty-eight behaviours for what the users have used voice assistants for. The modal average responses yields 23.29% of users stating they mostly use their voice assistants to set timers, alarms, reminders, or events. After this, asking or searching broad questions and controlling music applications both sit equally at 17.81% each. Most of the answers provided relate to instructional commands, as opposed to seeking direct conversational dialogue. However, conversational approaches are still a part of the dialogue exchange with voice assistants as a core focus of voice assistant functionality. This supports the literature review's argument that modern video game RPGs can benefit from this adoption. Interestingly, one response mentioned using a voice assistant to play a game called *Skyrim Very Special Edition* (Bethesda Game Softworks, 2018). This game is a ported audio-focused version of the original *Skyrim* (Bethesda Game

Studios, 2011) game built for Amazon's Alexa. Another notable response included 9.59% of these answers relating to users finding voice assistants as a practical service during activities where their hands are already busy. For example, driving, cooking, and washing dishes were the identified responses. This is something that also translates to being a useful advantage when playing games because a conversational interface like voice assistants can allow players to continue focusing on their core objective. This supports the greater research body's reasoning that voice-focused interfaces can potentially reduce interruption and keep players immersed with a state of cognitive flow.

Furthermore, users who had not used a voice assistant before also stated their reasons for not doing so, with the data cleaned up in the following table:

Reasons For Not Using Voice Assistants	Entries
Not Interested in Using or See No Need	13
No Specific Reason for not Using or not had Opportunity Yet	6
Privacy Concerns	4
Cannot Afford	1

(Table 3.10: List of reasons why voice assistants have not been used)

Consequently, twenty-four responses from participants explained their reasoning for this. The most common reason, cited by 13 participants at 54.17%, was a lack of interest or a perception that they had no need to use such technology. Six participants, at 25%, stated there was no specific reason for not using them, or they had simply not had the opportunity to try voice assistants to date. Privacy concerns were mentioned by four participants at 16.67%, while one participant, at 4.17%, attributed their non-use to being unable to afford a device incorporating a voice assistant. This distribution highlights that, while privacy and affordability are factors, a significant proportion of respondents might be open to adopting voice assistants if given the opportunity or if their interest is piqued.

Additionally, the following table shows additional data provided by some participants that specifically emphasises which voice assistants they have used:

Voice Assistants Used	Entries
Google	8
Alexa	7

Siri	5
Cortana	1

(Table 3.11: List of voice assistants used by participants)

This list of voice assistants shows what players are already familiar using and will create a useful point of research for possible services that could function as a potential solution in the proposed methodology chapter.

Figure 3.16 moves on to question participants about how they think voice assistant interactions can translate successfully into a video game environment. The responses are split into two tables, which makes the data easier to process. The following table shows the answers that amalgamate to whether participants think interactions can translate to a video game:

Video Game Translation	Entries
Potentially One Day	15
Yes, They Can Translate	8
Do not Know or Not Sure	6
No, They Do Not Translate	1

(Table 3.12: List of participant thoughts on translating interactions to game environments)

Thirty individual responses provided opinions on whether voice assistants translate into video games. 53.33% of these state that they believe the capability for technology implementation is not currently possible. However, 93.75% of that percentile express they are optimistic that it will have the desired potential eventually. Whereas 26.67% of the responses in Table 3.12 indicate a belief that the technology is already at a point where it can translate into video game experiences, leaving 20% to say they honestly do not know or are not sure.

The other set of data taken away from Figure 3.16 shows examples of how participants believe voice assistant interactions can translate into video games specifically, as follows:

Video Game Uses	Entries
NPC Interaction	26
Increase Immersion or Depth	7
Trigger Gameplay Events	5

Text Adventures	2
Save From Typing	1
Quicker to Obtain Information	1

(Table 3.13: List of types of translated interaction types to game environments)

A majority of user answers, at 60.47%, parallel the idea that the style of interaction can directly relate to NPC interaction, whether by issuing commands, querying information, or directly engaging in natural conversation. This is useful as the greater research body reasoned that NPCs were amongst the top candidates for voice interactive narrative devices, and the pilot-study responses provide additional support for this direction. Additionally, the second most common answer sits at 16.27% and suggests that voice interaction can increase a player's sense of immersion or depth during gameplay.

The final question of section 1C explores what video game genre the survey participants believe could benefit most from using voice interaction. As a result, out of 155 entries, RPGs once again were the most common result at 30.97%. This was followed by simulation games as the second most common answer at 19.35%, and adventure games at 16.13%. This is valuable as the literature review reasoned that RPGs were amongst the leading candidates for research investigation, and this direction was also reflected in the pilot-study responses.

3.6.4 Section 04 – Human-Computer Interaction Questions

Figure 3.18 of section 1D begins by asking research participants whether they think the way humans and computer systems interact is a changing landscape. A considerable number of the responses, comprising 95.38%, expressed agreement with the notion that HCI is indeed a dynamic and evolving landscape, while the remaining 4.62% disagreed.

Subsequently, question 2 explores the reasoning behind the participants' perspectives on this evolving landscape. The resulting data has been organised into two tables, with Table 3.14 focusing on the primary reasons cited by respondents:

Reasons	Entries
Technology is Advancing	55
Humans are Progressing	21
Possibilities are Expanding	16

Do Not Know or No Reason	4
Interactions are Stagnant	1

(Table 3.14: List of reasons why human-computer interaction is a changing landscape)

As a result, table 3.14 categorises ninety-seven entries that shed light on participant responses and the rationales underlying their perspectives. Notably, the predominant viewpoint, involving 56.70% of entries, corresponds with a specific emphasis that technology continually advances and drives changes in HCI. Following this, 21.65% of the answers highlight the view that human capabilities are the contributing factor to the dynamic nature of HCI by always changing, adapting, and becoming more advanced. Additionally, 16.49% of responses did not attribute specific reasoning but still emphasised the view that more possibilities continue to expand within the realm of HCI.

Altogether, these responses equate to 94.85% of the answers signifying the sentiment that growth and change are an inevitability within HCI. This is important because it indicates an acceptance of innovation and advancement in the field that underscores the importance of adaptability in navigating the evolving landscape.

The additional data in table 3.15, relating to question 2, reveals specific areas within HCI that the study participants identified as key focal points of the changing landscape, as follows:

Examples	Entries
Accessibility & Innovation Considerations are Growing	15
AI & Machine Learning is Evolving	14
Voice Interaction is Improving	6

(Table 3.15: List of examples where human-computer interaction is a changing landscape)

According to table 3.15, 42.86% of contributors drew attention to the growing importance of accessibility and innovation considerations within HCI. Additionally, 40% of the answers emphasised a perspective that the HCI landscape is changing because of the transformative impact of artificial intelligence (AI) and machine learning. Moreover, 17.14% of participants highlighted a perspective that voice interaction itself is an area that is experiencing significant improvement.

This data is particularly noteworthy as it aligns with insights from the literature review, which suggested these areas as significant topics for research, especially in the context of natural language advancements in game narrative design. The consensus among participants reaffirms the relevance of these areas in shaping the evolving landscape of HCI.

Question 3 of the pilot study prompts participants to reflect on positive interactions they have had with NPCs in video games and describe why these experiences stood out to them. The findings from Figure 3.20 are organised into table 3.16 for clarity:

Positive NPC Interactions	Entries
Dialogue	43
Not Applicable	12
Narrative	6
AI Capabilities	4
User Interface Controls	1
Depth Revealed in Cutscenes	1
Intuitive Controls	1
Music Accompaniment	1
Accessibility Considerations	1
Voice Interaction	1

(Table 3.16: List of positive NPC interactions that have stood out to participants)

According to the data, of the seventy-one entries reported by study contributors, 60.56% of the sample finds that the positive experiences described relate to how dialogue is handled in NPC interactions. This includes the writing itself, conversational options for branching content, scripted reactions, delivery of discourse, character personalities, and composed backstory. The second most common entry stands at 16.90% and indicates responses where users provided no depth in an answer because they either did not know, were not sure, or had nothing specific to relay. Additionally, 8.45% emphasised the narrative connections, referencing questlines or plot points as influential factors. Furthermore, 5.63% of responses pointed to the capabilities of the AI, including behaviours in stealth, competitive racing, or how companions performed in combat. Notably, one participant highlighted an experience with voice interaction being a core experience that stood out to them in a positive way.

As a result, these findings underscore the significance of communication with NPCs in shaping positive player experiences, aligning with the insights from the literature review. The positive NPC interactions highlighted are grounded in the current state of industry narrative design techniques that use pre-authored approaches, and so, further research needs to explore how this perspective can be challenged with innovative technology. This is especially the case with modern technology that promotes more conversational freedom that has the potential to enrich conversational dynamics and redefine player-NPC interactions.

Subsequently, question 4 of the study explores the contrary and requests participants to reflect on negative interactions they have had with NPCs in video games. This is followed by another description on why these negative experiences stood out to them. The findings from Figure 3.21 are cleaned up into table 3.17 for ease of comprehension:

Negative NPC Interactions	Entries
Mundane Dialogue	28
Not Applicable	14
Limited Interaction	8
Unrealistic AI	7
Purposeless	7
Misunderstood Choices	5
Unintuitive Controls	4
Difficult UI interaction	2

(Table 3.17: List of negative NPC interactions that stood out to participants)

Table 3.17 categorises a total of seventy-five entries, revealing insights into players' negative experiences with NPCs. Notably, the most frequently reported issue, comprising 37.33% of responses, revolves around mundane dialogue. Players expressed frustration with dialogue that felt uninteresting, poorly written, or excessively repetitive. This highlights a common problem identified in the literature review, which found that such issues can disrupt player immersion and indicate a lack of clear narrative focus during game development. Next, 18.67% of responses indicated a lack of usable data, where participants suggested uncertainty, inability to recall, or a general lack of specific reasons for negative interactions. Limited interaction opportunities, cited in 10.67% of responses, contributed to player

frustration when they desired more meaningful engagement with NPCs but encountered restrictive dialogue systems. These findings align with observations from the literature review, which identified similar issues as challenges in current NPC interaction design. Moreover, 9.33% of participants identified a lack of clear purpose in what the NPCs served as a source of negative interactions, while 6.67% mentioned misunderstandings stemming from pre-authored dialogue leading to unintended conversational paths. These insights reinforce the importance of designing NPC interactions that are engaging, meaningful, and aligned with player expectations, as emphasised in the literature review.

Question 5 of the questionnaire explores participants' views on how they feel the negative experiences highlighted in question 4 could have been prevented. The resulting data from Figure 3.22 is organised into Table 3.18 as follows:

Preventative Measures	Entries
Improved Narrative Approaches	35
Not Applicable	20
Improved AI Development	8
More Interaction	4
Improved Controls	2
Less UI Interaction	1
Improved Level Design	1

(Table 3.18: List of suggested preventive measures for negative NPC interactions)

As a result, Table 3.18 captures seventy-one entries that reveal the participants' perspectives. Nearly half of these entries, forming 49.30%, advocate for more improved narrative approaches. Key highlights include a desire for less repetitive dialogue, enhanced conversational navigation without pre-authored menu options, NPC interactions that feel more unique, and realistic speech. This is interesting as these findings echo the need for updated research highlighted in the literature review that underscores the importance of modernising interaction techniques to meet consumer expectations. Improvements through AI development was also emphasised by 11.27% of users who suggested an exploration into modern applications such as machine learning techniques and large-language models (LLM) to enhance NPC behaviour. This aligns with the greater research body, where LLMs were raised as an area for further investigation into conversation freedom and

underscores the relevance of incorporating modern technologies into the methodology section. Other notable suggestions include 5.63% of participants expressing interest in higher levels of interaction with NPCs and 1.41% emphasising a desire for less reliance on UI interaction systems. These suggestions resonate with the broader research body's emphasis on investigating modern conversational approaches to address consumer preferences.

Table 3.19 presents the data from Figure 3.23, where the contributors illustrated the array of peripherals they use when playing video games:

Information Access	Entries
Mouse	54
Keyboard	54
Touchscreen	17
Gamepad	41
Microphone	18
Speakers	33
Monitor Display	46
Headphones with built-in microphone	34
Headphones without built-in microphone	13
Virtual Reality Headset with built-in microphone	2
Virtual Reality Headset without built-in microphone	2
Virtual Reality Headset with built-in speakers	1
Virtual Reality Headset without built-in speakers	2

(Table 3.19: List of peripherals used to play video games)

As a result, 317 entries were reported, providing valuable insights into the gaming hardware configurations of participants. An overwhelming majority, encompassing 83.08% of respondents, indicated they have access to a conventional mouse & keyboard setup when it comes to their gaming sessions. This observation suggests widespread access to traditional input methods, which aligns with the literature review, and emphasises the exploration of input methodologies as advantageous to fostering conversational freedom in video game experiences. Furthermore, 26.15% of participants reported they have access to a microphone, indicating the potential integration of voice interaction as an input method. This data is useful for the

significance of voice-based interaction in common gaming setups and its potential to enrich immersive and interactive gaming encounters with NPCs.

Figure 3.24 illustrates the participant responses to question 7 which asks if they have ever used their voice or written input in a video game to communicate with an NPC. The data has been tidied up in the following table:

Voice/Written NPC Interaction History	Entries
No	44
Yes	21

(Table 3.20: Responses according to participants' history with NPC interaction)

As a result, 67.69% of the sixty-five participants provided data that related to having not interacted with NPCs in this way. This answer in Table 3.20 incorporates answers that suggest the respondent cannot remember, is not sure, is sure, or provides no specific details. Whereas, the remaining 32.31% indicate that they have indeed interacted with NPCs within video games with their voice or through text input.

Finally, question 8 subsequently explores the specifics of reported NPC interactions from Figure 3.24, focusing on whether participants engaged through typed or spoken input and the corresponding gaming experiences. For participants who affirmed previous NPC interactions in this style, as shown in Table 3.20, this question prompts them to elaborate on their input method and share their gaming experiences. Conversely, respondents who indicated no previous NPC interaction like this are asked to expand upon their reasons for not having done so. The key insights derived from Figure 3.25 are organised into two tables, with Table 3.21 focusing on participants' descriptions of interaction methods as follows:

Described Voice/Written Interaction	Entries
Written Input	18
Spoken Input	5

(Table 3.21: List of described interaction methods)

Of the 66 total entries, 34.85%, provide insights into the types of NPC interactions experienced by participants. Notably, 78.26% of that subset indicates the use of written input, often associated with traditional text-based adventure games like

Façade (Mateas & Stern, 2005). This suggests a familiarity among participants with this style of NPC interaction.

Conversely, the remaining 21.74% of responses for this part of the question highlight the utilisation of spoken input in video games. However, examples cited, such as Nintendogs (Nintendo EAD, 2005), Lifeline (Sony Interactive Entertainment, 2003), and SOCOM U.S. Navy SEALs (Zipper Interactive, 2002), largely represent rudimentary forms of spoken interaction, which can be perceived as antiquated in comparison to modern solutions.

These findings underscore the importance of exploring modern solutions to enhance NPC interaction, as identified in the literature review. By experimenting with innovative approaches, such as advanced NLI systems and LLMs, developers can create more meaningful interactions and potentially elevate the overall NPC interaction experience.

Subsequently, question 8 of the pilot study also elucidates the factors influencing participants' reasons for not having used written or spoken input for NPC interaction. The data collected from this part of the question is presented in Table 3.22, as follows:

Reasons For Not Using Voice/Written Interaction	Entries
Lack of the Mechanic	25
Not Applicable	9
No Reason	4
Not Interested	4
Believes it is not Possible	1

(Table 3.22: List of reasons why voice/written interaction has not been explored in games)

Analysis of the data reveals that the most dominant response, constituting 58.14% of the forty-three entries, attributes the lack of written or spoken interaction with NPCs to the games participants have played. Specifically, these are games that have an absence of interaction mechanics that affords players the capability to utilise this style of NPC interactivity. Additionally, 20.93% of responses were deemed unusable due to insufficient information provided.

Furthermore, 9.30% of responses indicated either a disinterest in exploring games that include this type of interaction, or a forthright aversion to the concept. Similarly, an additional 9.30% expressed a lack of awareness regarding this type of interaction. Interestingly, 2.33% of respondents expressed scepticism about the feasibility of such an interaction being able to exist in video games.

Overall, the majority of responses point to a lack of exposure or awareness of the possibility of written or spoken communication with NPCs as a mechanical interaction. This finding aligns with the insights gathered from the literature review, highlighting the potential of this area of research to shed light on the effectiveness of modern technological solutions in facilitating interactive gameplay.

3.7 Findings of the Analysis

Through a comprehensive analysis of participant responses, the study aimed to reveal player perceptions and preferences regarding video game narrative design, NPC interaction, and the integration of NLI technologies. These findings not only inform the theoretical framework of the thesis but also lays the groundwork for the later chapter aimed at crafting an immersive gameplay experiment.

3.7.1 Summary of Key Findings – Game Narrative Design

1. Importance of NPCs to Narrative Experience:
   Many respondents recognise that NPCs play a crucial role in the success of a game's narrative. This consensus highlights the need for more sophisticated NPC interactions, aligning with the focus on the thesis exploring NLI to enrich these experiences.

2. NPC Information Delivery:
   Participants suggested varying degrees of high importance regarding the delivery of narrative content through NPCs. This reinforces the perspective that NPCs are core to unfolding a game's narrative elements and supports the view to further research enhancements via NLI.

3. Narrative Devices and Player Engagement:
   The data revealed a strong preference for environmental storytelling and interactive dialogue as core narrative devices. This suggests that advancing interaction techniques could meaningfully enhance NPC presence and

associated dialogue, potentially increasing player immersion and engagement.

4. Perceived Realism in NPC Interactions:
   When asked about the realism of NPC interactions compared to real-life conversations, the responses highlighted a perceived gap. Many found NPC dialogue either too scripted or lacking in depth, suggesting an area for improvement could exist through more dynamic and responsive interaction systems like NLI.

The clear importance of NPCs in narrative delivery and the desire for more realistic interactions provide a solid foundation for exploring modern technology solutions. Specifically, these results highlight the potential to explore the current gap in NPC realism and responsiveness, making NPC interactions not only more engaging but also more integral to the gameplay experience.

3.7.2 Summary of Key Findings – Natural-Language Interaction

1. Player Exposure to Voice Interaction:
   The survey indicated that a sizeable proportion of participants have played games featuring voice interaction capabilities. However, a notable segment of these users did not utilise this feature actively, pointing to the potential underutilisation of voice technologies in games, which may stem from their current implementation or perceived impracticality.

2. Experiences with Voice Interaction:
   Among those who engaged with voice interaction features, the feedback was mixed. While some found the experience engaging and innovative, a significant number of reported frustrations due to technical limitations, such as poor voice recognition and unsatisfactory NPC responses. This suggests a gap between player expectations and the current state of technology in voice-interactive games.

3. Perceptions of Voice Assistants in Games:
   Many participants drew parallels between voice interactions in games and the functionality of commercial voice assistants. A common suggestion was that game designs could benefit from integrating the advanced features of modern

voice assistant approaches to improve gameplay interactivity and narrative depth.

4. Potential for NLI in Enhancing Game Narratives:
   There was a strong consensus that voice interaction has the potential to significantly enhance narrative experiences in games. Participants highlighted that more intuitive and responsive NLI systems could lead to deeper engagement and a more immersive gameplay experience.

These insights emphasise a clear interest and perceived potential among players for enhanced voice interaction capabilities that could improve narrative interaction within games. Additionally, the feedback on current limitations provides direct guidance on the areas that need attention in developing new NLI solutions.

3.7.3 Summary of Key Findings – Human-Computer Interaction

1. Changing Landscape of HCI:
   A great majority of respondents confirmed the belief that the landscape of HCI is continually evolving. This perception is crucial as it reflects a general openness among players to new technologies and interaction innovation in video games.

2. Advancements in Technology:
   Participants frequently cited advancements in technology as a driver for change in HCI. This includes improvements in artificial intelligence and machine learning, which are particularly relevant for developing more sophisticated interaction systems in video games.

3. Expectations for Interactivity:
   The data revealed that players expect high levels of interactivity in video games, which should represent or surpass their experiences with modern interactive technologies like voice assistants. This indicates a demand for game designs that incorporate more intuitive and responsive interaction systems.

4. Perceptions of Voice Interaction:
   Discussions about voice interaction revealed that some players are

enthusiastic about its potential to enhance gaming experiences, whilst others remain sceptical due to inadequate experiences. This highlights the importance of addressing the technological limitations and the player scepticism in future NLI implementations.

5. Impact of HCI on Gameplay:
   Many respondents highlighted specific instances where HCI has significantly impacted their gameplay experience, suggesting that well-designed interactions can enhance player engagement and satisfaction.

These insights acknowledge the evolving HCI landscape and supports the need for ongoing research and development in game design, especially when incorporating innovative technologies like NLI to meet player expectations.

3.8 Integration with Existing Research

The findings of this pilot study provide an opportunity to contextualise participant responses within the broader discourse explored in the previous literature review chapter. By comparing the observed behaviours and preferences of participants to established theoretical and empirical studies, this section seeks to identify areas of alignment, contrast, and potential innovation.

The study's results highlight the importance of narrative flexibility, NPC behaviour, and intuitive interaction systems in shaping player experiences. These findings resonate with prior research that highlights the role of emergent storytelling, conversational freedom, and responsive interfaces in enhancing immersion and engagement in narrative-driven games. However, they also reveal gaps and challenges, particularly in balancing player agency with narrative coherence, maintaining system responsiveness, and managing user expectations in dynamic interactions.

This section evaluates the pilot study findings in relation to the literature in three core areas: narrative game design, NLI, and HCI. By exploring these connections, it aims to reinforce the relevance of the pilot study to the existing body of research while identifying opportunities for further exploration and refinement in subsequent phases of this PhD study.

3.8.1 Integration with Existing Research – Game Narrative Design

Regarding the influence of narrative design and NPC behaviour in fostering player engagement, the findings of this pilot study align closely with the literature's emphasis on narrative flexibility and emergent storytelling. Koenitz underscores the significance of embedding both structured and emergent narratives within games to foster dynamic player experiences (Koenitz, 2024). This theoretical framework is reflected in the pilot-study responses, where participants associated adaptive NPC behaviour with greater immersion and believability within the game world.

The literature also highlights the critical role of NPCs as narrative agents, as discussed by Warpefelt and Verhagen, who describe NPCs as conduits for blending mechanical and thematic elements in games (Warpefelt & Verhagen, 2017). Similarly, the pilot study participants frequently identified NPC interactions as pivotal to their engagement, especially when NPCs responded contextually to environmental cues or player-driven dialogue. This finding supports the idea that NPCs serve as dynamic participants in storytelling, as explored through dramatic situations by Lessard and Paré-Chouinard (Lessard & Paré-Chouinard, 2022). The concept of dramatic situations, where NPCs adapt their roles to the player's actions, emerged as a relevant lens through which to interpret the pilot study's results. For instance, players noted moments of unexpected NPC reactions as both memorable and meaningful, consistent with Lessard and Paré-Chouinard's theory of co-created narratives.

Moreover, the pilot study revealed that while players valued emergent storytelling, they also sought coherence in NPC behaviours and story progression. This reflects the tension identified in the literature between player-driven freedom and the need for narrative cohesion (Calleja, 2013; Arinbjarnar et al., 2009). Players in the study cited moments where NPCs appeared "off-script" or failed to align with the broader narrative as immersion-breaking, highlighting the importance of balancing emergent elements with structured storytelling.

The insights from the pilot study also resonate with the findings of Jenkins, who discussed the role of NPCs in creating enacted narratives by allowing players to embody characters within a dynamic story universe (Jenkins, 2004). The pilot study participants frequently noted that NPCs who exhibited a sense of autonomy and adaptability created a greater sense of agency, echoing Jenkins' perspective on emergent narratives driven by player interaction.

Finally, while this pilot study did not yet fully integrate natural language systems, participants expressed interest in more flexible NPC dialogue options, suggesting an opportunity for future work to expand on the potential of NLI. This reflects the literature's proposal that conversational freedom could bridge the gap between structured and emergent storytelling (Lessard, 2016; Brusk & Björk, 2009).

In summary, the pilot study reinforces the literature's central themes: NPCs as dynamic narrative agents, the importance of balancing player-driven agency with coherence, and the transformative potential of NLI in advancing narrative game design. These findings provide a strong foundation for exploring how NLI-driven systems could address gaps in current game design frameworks, particularly in RPGs, where narrative complexity and player engagement are paramount.

3.8.2 Integration with Existing Research – Natural Language Interaction

The results of the pilot study highlight participants' mixed experiences with conversational systems, which closely align with themes from the literature on NLI. As noted in the review by Lessard, NLI represents a critical innovation in enabling player agency, particularly through free-form dialogue systems (Lessard, 2016). Participants in the pilot study echoed this potential, expressing a strong preference for interactive dialogues that allowed for greater flexibility and creativity in their responses, a finding that aligns with the strengths of NLI identified in experimental systems like *Façade* (Mateas & Stern, 2003).

The study also revealed participants' frustrations with instances of unclear or constrained dialogue options. This reflects the challenges outlined by Brusk and Björk, who caution that the effectiveness of NLI systems depends heavily on maintaining coherence and responsiveness to player inputs (Brusk & Björk, 2009). Miscommunication and disjointed NPC reactions, observed in the pilot study, mirror Wardrip-Fruin's Eliza Effect, where systems create the illusion of intelligence but fail to sustain meaningful interactions over time (Wardrip-Fruin, 2012). Participants frequently cited moments where NPCs misunderstood or provided irrelevant responses as immersion-breaking, reinforcing the literature's emphasis on balancing conversational freedom with narrative coherence.

Additionally, participants noted that conversational systems were most engaging when NPCs demonstrated awareness of the game context or prior interactions, a finding that resonates with the work of Allison et al. (Allison, et al., 2018). Their study

emphasises the importance of player modelling in adapting NPC responses to individual playstyles and narrative histories. In the pilot study, participants expressed satisfaction when NPC dialogue appeared to reflect their prior choices, highlighting the role of adaptive systems in enhancing narrative immersion.

The pilot study findings also provide evidence for the potential of NLI to foster emergent storytelling, as discussed by Lessard (Lessard, 2016). Participants described moments where they were able to explore narrative possibilities beyond predefined paths through conversational experimentation. This aligns with Brusk and Björk's assertion that NLI enables non-linear storytelling by allowing player inputs to dynamically shape dialogue and narrative progression (Brusk & Björk, 2009). However, the pilot study also revealed that participants felt constrained by the limited range of NPC responses, suggesting a need for more robust NLP technologies to support emergent and collaborative storytelling.

Another notable parallel between the pilot study and the literature lies in the application of mixed-initiative dialogues. As highlighted by Bontchev and demonstrated in projects like *SimProphet*, mixed-initiative systems create more organic and engaging interactions where both players and NPCs can direct and shape conversations (Bontchev, 2016; Lessard, 2016). Participants in the pilot study expressed interest in NPCs that could introduce their own conversational threads or challenge player assumptions, suggesting that future NLI systems should prioritise this feature to enrich the storytelling experience.

Finally, the pilot study underlines the importance of diegetic design in managing player expectations during interactions with NLI systems. Allison et al. and Lessard argue that framing NPCs with narrative constraints, such as eccentric personalities or limited understanding, can mitigate frustration when systems fail to comprehend player inputs (Allison et al., 2018; Lessard, 2016). Participants in the study showed greater tolerance for conversational limitations when NPCs were characterised in ways that contextualised their behaviour within the game's narrative world.

In summary, the pilot study supports key findings from the literature, particularly the potential of NLI to enhance conversational freedom, emergent storytelling, and player agency. However, it also highlights the persistent challenges of coherence, responsiveness, and player expectations, as identified by Wardrip-Fruin and others. These insights suggest that research should focus on integrating adaptive NPC

systems, mixed-initiative dialogues, and advanced NLP technologies to address the limitations of current implementations. For RPGs, where narrative depth and character interactions are central, these advancements could significantly elevate the player experience.

3.8.3 Integration with Existing Research – Human-Computer Interaction

Findings on the HCI portion of the pilot study reflect the critical role of interface design, system responsiveness, and player experience in shaping engagement with narrative-driven games. These results align strongly with the literature's emphasis on the distinct priorities of HCI in video games, which diverge from traditional productivity-focused systems to prioritise immersion, challenge, and emotional resonance (Barr, et al., 2007). Participants in the pilot study frequently highlighted the importance of intuitive and responsive interfaces for enhancing their ability to interact with NPCs and navigate narrative experiences, consistent with Barr et al.'s notion that interfaces in games act as mediators of narrative and gameplay.

A recurring theme in the pilot study was the participants' preference for interfaces that blended seamlessly with the game's narrative and mechanics. This aligns with Jenkins' and Brusk and Björk's perspectives that HCI in narrative games should integrate storytelling elements directly into the interaction design (Jenkins, 2004; Brusk and Björk, 2009). Participants expressed frustration with interfaces that interrupted the flow of gameplay, reinforcing the importance of maintaining immersion through diegetic and non-intrusive systems. For example, when interfaces provided contextual prompts or dynamic feedback that tied directly to the narrative, players reported greater satisfaction, echoing the literature's emphasis on cohesion between gameplay and narrative delivery.

The findings also emphasised the critical role of feedback mechanisms in maintaining player engagement, a point highlighted by Allison et al. (Allison, et al., 2018). Participants noted that clear, contextually appropriate responses from the system enhanced their perception of agency and immersion. This supports the literature's assertion that HCI systems must not only enable input but also provide meaningful output that reinforces player actions within the game world. Instances where the system failed to acknowledge or adapt to player inputs were frequently cited as immersion-breaking, reflecting Wardrip-Fruin's caution regarding the Eliza Effect in interactive systems (Wardrip-Fruin, 2012).

Participants also identified the importance of transparency and intuitive design in managing player expectations during interactions. This observation is consistent with Allison et al.'s findings that effective HCI systems should provide subtle cues about the types of inputs they can process (Allison, et al., 2018). When participants felt uncertain about how to interact with NPCs or navigate dialogue systems, it led to confusion and reduced engagement. This suggests that interface clarity and usability remain foundational, even in the context of complex narrative-driven interactions.

Another key area where the pilot study aligns with the literature is in its exploration of the role of NPCs as interaction points within the HCI framework. Participants often praised NPCs that displayed adaptive behaviours and dynamic responses, reinforcing Warpefelt and Verhagen's argument that NPCs serve as critical elements of both narrative delivery and player interaction (Warpefelt & Verhagen, 2017). The pilot study highlighted that participants valued NPCs who felt responsive and integrated into the game world, further supporting the literature's assertion that NPCs should function as believable agents within the interactive system.

Finally, the pilot study highlights the potential for HCI systems to support emergent and player-driven storytelling through natural language interfaces. This aligns with Brusk and Björk's, and Lessard's insights into the potential of mixed-initiative dialogues (Brusk and Björk, 2009; Lessard, (2016). Participants expressed a desire for systems that allowed NPCs to take more active roles in conversations, redirecting or expanding discussions in ways that felt organic and engaging. This reflects the literature's call for HCI systems that balance player agency with system-driven interaction to create immersive and dynamic experiences.

In summary, the pilot study reinforces the key findings of the literature regarding HCI in narrative-driven games. It highlights the importance of interfaces that are intuitive, responsive, and seamlessly integrated into the narrative experience. These insights align with the literature's emphasis on cohesion between interaction systems and storytelling, the role of feedback in maintaining immersion, and the potential of advanced interaction technologies such as NLI to influence player experiences. Addressing the challenges of usability, narrative coherence, and player expectation management identified in both the pilot study and the literature will be critical for the future development of HCI systems in RPGs.

3.9 Summary of the Pilot Study

This chapter has produced critical insights from video game consumers across fields concerning game design, NLI, and HCI. These findings have supported an argument for further investigation into the integration of modern NLI technologies to enhance NPC interactions and overall player experience.

The final considerations taken forward to the main research experiment are as follows:

1. Game Narrative Design:
   The pilot study confirmed the significant role of NPCs in narrative experiences and highlighted player expectations for NPCs that dynamically adapt their dialogue and responses based on player interaction. Therefore, the main experiment will focus on developing NPCs that offer more unique, individualised, and responsive interactions, exploring how these enhancements affect player satisfaction and narrative engagement.

2. Natural-Language Interaction:
   Insights into NLI revealed both challenges and opportunities, with players expressing a keen interest in more sophisticated voice interaction systems that could mimic the capabilities of modern voice assistants. Therefore, the experiment will implement and test modern NLI systems that aim to provide a more interactive narrative experience, addressing the technical challenges of input recognition accuracy and the contextual relevance of NPC responses.

3. Human-Computer Interaction:
   Responses indicated a rapidly evolving expectation for HCI with video games, emphasising a need for interfaces that are both advanced and accessible. Therefore, efforts will be directed toward enhancing the realism and responsiveness of NPC interactions using standard gaming setups. The effectiveness of these approaches, mixed with modern NLI techniques, will be rigorously evaluated for player immersion and satisfaction.

In conclusion, the pilot study's additional exploration into game design, natural-language interaction, and human-computer interaction has revealed more insights that support an argument for investigating modern NLI technologies in RPGs.

Specifically, the integration of NLI for NPCs, which is not fully addressed in existing literature.

The upcoming chapter will detail the development of this research methodology, providing clarity on the experimental design and the evaluation strategies. This approach ensures that the study is guided by a clear framework, which aligns with the overarching research objectives. It will examine the practical aspects of implementation strategies, from developing the experiments to recruiting participants and conducting the evaluations. This planning is crucial for translating theoretical concepts into actionable research outcomes.

Chapter 04: Evaluation Methodology

4.1 Introduction

As identified in the literature review, significant gaps exist in knowledge of narrative game design in terms of natural language interaction (NLI) for Non-Player Characters (NPCs). So, building on insights from the pilot study, this chapter outlines the methodology designed to address these gaps and advance knowledge in the field.

The first section describes the development of the research methodology going forward. It will detail the requirements of the experimental design and the chosen style of evaluation in order to provide clarity on the overarching framework guiding the research process.

Following this, the second section explains the construction of the experiment, including the selection of content to be evaluated, strategies for participant recruitment, and the method for conducting the evaluation. This section delves into the actionable objectives and defines the specific practices to be followed.

The third section outlines the essential ethical protocols approved by the University of Staffordshire’s ethics committee, ensuring the protection of participants' rights and well-being throughout the study.

Subsequently, the fourth section explains the design of the research questionnaire, detailing the rationale behind its strategy. This section provides insight into the method used for data collection and highlights its alignment with the research objectives.

The fifth section highlights the data analysis approach and details the techniques that will be applied to the qualitative and quantitative results produced by the core thesis experiment.

Lastly, the final section of the chapter concludes with a summarisation that outlines the key points discussed and provides a plan for moving forward into the design and development stage.

4.2 Research Methodology

The methodology uses a software prototype, in the form of a digital game, to investigate player interaction with contemporary NLI systems. Participants engage

with the prototype before completing a post-play questionnaire designed to collect both quantitative and qualitative evidence concerning their experience. This mixed-methods approach develops from the questionnaire principles discussed in section 2.8 of Chapter 2 and the preliminary findings gathered through the pilot study in Chapter 3.

Rather than adopting a standardised player-experience instrument, the questionnaire is designed around the specific requirements of the research questions and the three areas investigated throughout the thesis: game narrative design, natural language interaction, and human-computer interaction. Structured response questions provide comparable participant evaluations across areas such as narrative agency, realism, conversational freedom, engagement, immersion, and intuitiveness, while open-text questions provide further explanation and identify observations that may not be represented through predetermined response categories (Papachroni & MacIntosh, 2014).

Where appropriate, questions use four-point ordered rating scales without a neutral midpoint. This forced-choice structure requires participants to indicate the direction of their evaluation while recognising that the presence or absence of a midpoint can influence response patterns (Garland, 1991). The structured results are therefore interpreted alongside the open-text responses rather than being treated as independent measures of the player experience. This combination supports the broader aim of examining not only how participants evaluate the NLI-driven prototype, but also the reasons underlying those evaluations.

4.3 Human-Computer Interaction Experiment

4.3.1 Content Being Evaluated

Participants will all interact with the same environment, which focuses on challenging them to complete tasks that require NLI via written or spoken input. The breakdown of methodology requirements is categorised by field into Game Narrative Design, Human-Computer Interaction (HCI), and Natural Language Interaction (NLI) as follows:

To meet the narrative design components of the software prototype, the game structure follows a Role-Playing Game (RPG) framework where the following genre-specific characteristics need to be present: avatar ownership, character movement & interaction, highly developed environment, explorable environment, established

narratives, and dynamic character communication. Narrative design also needs to be a highlight for supporting the RPG genre, which will be emphasised via Non-Player Character (NPC) design in dialogue collaboration, realism & immersion, and as a narrative device that functions as a central pillar.

Regarding HCI, there are two sides to consider relating to hardware and software. These are important to research accuracy as the prototype needs to be playable on a computer system within a player's home environment, with specifications that are considered average. As such, the most comprehensive and regularly updated information on these elements is publicly available on Steam (Valve, 2021). Steam is one of the largest digital video game distribution platforms, and it conducts monthly surveys that collect data anonymously from its users about the hardware and software being used to play games on the platform. Therefore, details from these players will be examined and decisions will be made concerning what specifications would be fitting for the research game being developed. Additionally, to build the prototype, a comparison of game development engines will reveal the most appropriate candidate for the task.

For integration of an NLI system, large-scale technology firms that provide modern solutions will be examined for extensive natural language services. This is due to the massive amounts of data and infrastructure they use to support their products, and how accessible their services are when making considerations from a development perspective. Additionally, the methodology will also begin with an examination of plugins that allow for an expandable interactive dialogue system that calls the natural language services.

4.3.2 Sampling and Recruiting Participants

The questionnaire will primarily be directed towards student & staff cohorts of the University of Staffordshire's Games Development department. This is due to the readily available large student body that is relatively familiar with the area the research is based on, and the researcher's ease of access to said cohorts. The request for participation will be opt-in only and occur onsite at the University of Staffordshire which only these cohorts can access. The first method of outreach will focus on emailing the student body via module class announcements that will be received by those connected to those modules. The second method of outreach will be an announcement within a Microsoft Teams channel that is only accessible by staff.

4.3.3 Conducting the Evaluation

Once research participants have been recruited, participants will be invited to a designated quiet workspace that has been chosen to minimise disturbances from foot traffic and external noise pollution. Upon arrival, participants will receive a detailed briefing about the experiment's procedures. They will be provided with an ethically approved participation information sheet, which reiterates their role in the experiment and details the use of their contributed data.

Following the briefing, participants will be invited to ask questions about the experiment and required to sign a consent form. This will ensure that they have understood and agreed to the terms of participation. Once consent is obtained, the experiment will begin.

Participants will be instructed to open a digital game specifically developed for this research. Detailed instructions on how to play will be provided within the game interface. A timer will be set for 30 minutes, during which participants will engage with the game independently, without any interference from the researcher. Upon conclusion of the 30-minute timer, the gameplay session will end.

Finally, immediately following the 30-minute gameplay session, participants will complete the ethically approved questionnaire designed to gather feedback on their experience. Conducting the questionnaire directly after gameplay allows participants to reflect on specific interactions, tasks, and NPC conversations while the experience remains recent. This marks the conclusion of their involvement in the study.

4.4 Ethical Considerations

The ethics procedure follows a proportionate review process where the proposed research raises only minimal ethical risk and received full ethical approval by the University of Staffordshire’s ethics committee. The conditions for this are as follows:

1. The research itself will involve the development of an interactive software prototype that represents a video game experience where users will be able to test specific gameplay scenarios.
2. The test will require the participant to play the game on university facilities.
3. The game will be a single-player experience of the role-playing game genre, and interaction will be on a university computer through peripheral input consisting of a mouse, keyboard, and microphone.

4. In terms of security, the game software will be safe to use as the engine it uses is already installed on university computers.
5. Interaction and response feedback will be recorded anonymously via a questionnaire.
6. Email addresses will be collected only as an incentive option to be entered into a prize draw and will not be connected to the research itself.
7. Members of vulnerable groups will not be involved.
8. The research will not deliberately involve sensitive topics.
9. Participants will not be deliberately misled in any way.
10. Access to records of personal or confidential information, including genetic or other biological information, concerning identifiable individuals will not be involved.
11. The research will not induce psychological stress, anxiety or humiliation, cause more than minimal pain, or involve intrusive interventions.
12. The experiment will be conducted with the participant's full and informed consent at the time the study is carried out.
13. The main procedure will be explained to participants in advance, so that they are informed about what to expect.
14. Participants will be told their involvement in the research is voluntary.
15. Written consent will be obtained from participants.
16. Participants will be informed about how they may withdraw from the research at any time and for any reason,
17. For the questionnaire, participants will be given the option of omitting questions they do not want to answer.
18. Participants will be told that their data will be treated with full confidentiality and that, if published, every effort will be made to ensure it will not be identifiable as theirs.

Details of the Research Participation Information Sheet has been included in Appendix 2, with the researcher details, participation details, information & data, declaration, and participant consent requirements.

4.5 Questionnaire Design

The questionnaire developed for the main experiment builds upon the approach used during the pilot study and is structured to address the research questions more directly. The pilot study provided preliminary information concerning player

expectations of narrative design, NLI, and HCI, allowing these areas to be refined into questions concerning the specific features implemented within *Turing*. The final questionnaire therefore functions as an evaluation of both the overall player experience and the individual design areas investigated through the prototype.

The questionnaire is organised into five sections covering preliminary participant information, the research game, game design, natural language interaction, and human-computer interaction. Across these sections, structured response questions are combined with open-text fields so that patterns in participant evaluations can be considered alongside explanations of those responses. As discussed in section 2.8 of Chapter 2, this approach is appropriate to the research because many of the areas being investigated, including immersion, realism, agency, engagement, and intuitiveness, concern participant perceptions that benefit from both structured evaluation and qualitative explanation.

4.5.1 Section 01 – Preliminary Questions

No.	Question	Answers
1.	Do you play video games?	Yes
		No
2.	If yes, how often do you play per week?	0 to 4 hours
		4 to 8 hours
		8 to 12 hours
		12 to 16 hours
		16 to 20 hours
		20+ hours
3.	List the game genres you mostly play.	(Open field)
4.	What is your age group?	20 or under
		21 to 30
		31 to 40
		41 to 50
		51 to 60
		61 or above
5.	What gender do you identify as?	(Open field)
6.	Is English your first language?	Yes
		No

(Table 4.01: Preliminary questions asked in main experiment)

This section of the questionnaire is structured as an introductory segment to gently lead participants in. It features non-identifiable questions about their gameplay habits and speech, which is relevant for evaluating the NLI solutions implemented in the experiment.

The first question serves as a preliminary filter, designed to identify and possibly exclude responses from individuals who do not meet the basic criteria of playing games regularly. This is crucial, as the experiment targets participants who are not only familiar with video games but also possess a fundamental understanding of gaming mechanics.

The second question assesses the frequency of the participants' gaming sessions. This information provides insights into their familiarity with general gameplay systems and their potential proficiency in navigating game environments.

The third question provides a further point for comparative analysis, where the alignment of participant gaming habits can be analysed against the genre taxonomy of the experiment's game design.

Question four adds an added layer of depth to the analysis by gauging participants' range of experience and their openness to innovative gameplay and HCI technologies.

The fifth question records the gender of participants to provide further demographic context for the sample group. This information supports a clearer understanding of the composition of the participant pool and allows any imbalance in representation to be acknowledged when interpreting the findings.

Finally, the sixth question is designed to understand participant communication styles when using verbal input during the experiment. This is crucial because it could significantly influence the choice and effectiveness of the natural language understanding technologies adopted for the experiment.

4.5.2 Section 02 – Research Game

No.	Question	Answers
1.	What are your first impressions of the game you played?	(Open field)
2.	What did you enjoy about the game you played?	(Open field)

3.	What did you not enjoy about the game you played?	(Open field)
4.	What activities did you complete in the game?	(Open field)
5.	Have you played a game like this before?	Yes
		No
6.	Would you like to see more games like this?	Yes
		No
7.	If a game was released with a design like this, how interested would you be in it?	Very Interested
		Somewhat Interested
		Hardly Interested
		Not Interested at All
8.	Why did you select this answer?	(Open field)
9.	How likely would you be to recommend games like this to a friend?	Very Likely
		Somewhat Likely
		Hardly Likely
		Not Likely at All
10.	Any other comments?	(Open field)

(Table 4.02: Research game questions asked in main experiment)

With the experiment fresh in participants' minds, this section of the survey immediately captures participants' reactions to the video game they experienced to gain insights into their perceptions and engagement.

Questions 1 through 3 are designed to prompt initial impressions from the players, inviting them to provide general feedback on their enjoyment or dissatisfaction with various aspects of the gameplay. These questions help outline the elements that contribute to or detract from the gaming experience as perceived by the participants.

Question 4 explores the specific actions that players carried out within the game's open-world framework. This aims to understand the extent of each participant's interaction with various game characters and tasks, providing a measure of engagement with the range of character personalities.

Question 5 asks whether participants have previously encountered similar gaming experiences. This provides contextual information concerning prior exposure to comparable forms of interaction and allows subsequent responses to be considered alongside participants' existing experience.

Questions 6 through 9 evaluate participants' broader responses to the experimental game, including whether they would like to see more games using a similar approach, their interest in playing a released game of this kind, and their willingness to recommend similar games to others. These measures describe participant interest within the study sample rather than wider market demand or commercial viability.

Finally, Question 10 offers an open-ended opportunity for participants to provide additional comments and feedback, allowing for a broader range of insights into the game's implementation.

4.5.3 Section 03 – Game Design

No.	Question	Answers
1.	What genre would you identify the game you played with most?	Action
		Action-Adventure
		Adventure
		Role-Playing Game (RPG)
		Simulation
		Strategy
		Sports
2.	How important do you believe the NPCs were in achieving a successful narrative experience?	Very Important
		Somewhat Important
		Hardly Important
		Not Important at All
3.	By improving the NPC's access to information, do you think they performed better from a narrative point of view?	Much Better
		Somewhat Better
		Hardly Better
		Not Better at All
4.	Compared to other games, did you feel NPC interaction more closely compared to real life conversations with other humans?	Much Closer
		Somewhat Closer
		Hardly Closer
		Not Closer at All
5.	How much did you feel the narrative was being driven by you?	Very Much
		Somewhat

		Hardly
		Not at All
6.	How much do you think the NPC interaction encouraged player freedom?	Very Much
		Somewhat
		Hardly
		Not at All
7.	How much do you feel the NPC interaction gave context to the mechanics and game itself?	Very Much
		Somewhat
		Hardly
		Not at All
8.	How well do you feel the NPCs performed in delivering proper instructions to the player?	Very Well
		Somewhat
		Hardly
		Not Well at All
9.	How realistic did the NPCs feel?	Very Realistic
		Somewhat Realistic
		Hardly Realistic
		Not Realistic at All
10	How natural do you feel the NPCs were acting and perceiving their environment?	Very Natural
		Somewhat Natural
		Hardly Natural
		Not Natural at All
11.	Any other comments?	(Open field)

(Table 4.03: Game design questions asked in main experiment)

This section of the questionnaire shifts the participant's attention towards the game-design aspects of the experimental prototype, with particular emphasis on the role of NPCs within the narrative experience. The questions examine genre identification, the perceived narrative importance of NPCs, access to contextual information, realism, narrative agency, player freedom, gameplay context, instructional delivery, and NPC naturalness.

Question 1 asks participants to classify the experimental game according to genre. This provides a check on whether the prototype was perceived as aligning with the intended RPG framework.

Question 2 examines how important participants considered NPCs to the narrative experience within the prototype, providing evidence concerning their perceived role in the game's storytelling.

Question 3 asks whether participants felt that increased NPC access to information improved their narrative performance. This provides a participant evaluation of the contextual information made available to NPCs within the prototype.

Question 4 examines how closely participants felt NPC interaction compared with real-life human conversation, providing one measure of perceived conversational realism.

Questions 5 and 6 examine related but distinct aspects of player experience: the extent to which participants felt they were driving the wider narrative, and the extent to which NPC interaction encouraged player freedom. These questions provide measures relevant to narrative agency and conversational freedom.

Question 7 asks participants how well NPC interaction provided context for the game and its mechanics, examining the relationship between conversational interaction and the wider gameplay experience.

Question 8 evaluates participants' perceptions of how effectively NPCs communicated gameplay instructions, providing evidence concerning the clarity of task-related information delivered through interaction.

Questions 9 and 10 examine perceived NPC realism and naturalness. These measures provide evidence concerning NPC believability, including how participants evaluated both the characters themselves and their apparent interaction with the surrounding game environment.

Finally, Question 11 provides an open-text field through which participants could identify additional observations concerning the game design that were not captured by the structured questions.

4.5.4 Section 04 – Natural Language Interaction

No.	Question	Answers
1.	Have you ever used a virtual assistant? (For example, Alexa, Siri, Google etc.)	Yes
		No
2.		Yes

	Have you ever played a game that allowed you to interact using your own written or spoken voice?	No
3.	If yes, what was the game and how did it compare to the research game you just played?	(Open field)
4.	How successful do you think this interaction translated into the video game environment?	Very Successful
		Somewhat Successful
		Hardly Successful
		Not Successful at All
5.	How realistic did you feel the NPCs interaction was?	Very Realistic
		Somewhat Realistic
		Hardly Realistic
		Not Realistic at All
6.	Did you feel the NPCs understood you accurately?	Very Accurate
		Somewhat Accurate
		Hardly Accurate
		Not Accurate at All
7.	Did the NPCs feel engaging?	Very Engaging
		Somewhat Engaging
		Hardly Engaging
		Not Engaging at All
8.	Any other comments?	(Open field)

(Table 4.04: Natural Language Interaction questions asked in main experiment)

This section focuses specifically on participant experiences of the NLI systems incorporated into the experimental game. The questions examine prior familiarity with natural-language technologies and comparable game experiences before evaluating participants' perceptions of the implementation in relation to effectiveness, realism, understanding, and engagement.

Question 1 asks whether participants have previously used a virtual assistant. This provides contextual information concerning their prior familiarity with conversational technologies and the expectations they may bring to NLI interaction. It does not provide a direct comparison between the experimental system and individual virtual assistants.

Questions 2 and 3 examine whether participants have previously played games that allowed written or spoken natural-language interaction and, where applicable, invite them to compare those experiences with the experimental game. These questions provide a basis for considering *Turing* alongside previous game-based implementations encountered by participants.

Question 4 asks participants to evaluate how successfully they felt the natural-language interaction had been incorporated into the game environment, providing a measure of perceived effectiveness within the context of the prototype.

Question 5 examines participants' perceptions of realism during NPC interaction, providing evidence concerning how believable the resulting conversations felt within the narrative context of the game.

Question 6 asks participants how accurately they felt the NPCs understood their input. This provides a participant-centred measure of perceived conversational understanding rather than an objective assessment of the individual technical components responsible for processing input.

Question 7 examines how engaging participants found the NPCs during natural-language interaction. This provides a direct measure of perceived engagement with the conversational characters.

Finally, Question 8 provides an open-text field for additional observations concerning the NLI implementation that were not captured by the preceding structured questions.

4.5.5 Section 05 – Human-Computer Interaction

No.	Question	Answers
1.	Please highlight which of the following peripherals you used when playing the research game:	Mouse
		Keyboard
		Touchscreen
		Gamepad
		Microphone
		Speakers
		Headphones with built-in microphone

		Headphones without built-in microphone
		Monitor Display
		Virtual Reality Headset with built-in microphone
		Virtual Reality Headset without built-in microphone
		Virtual Reality Headset with built-in speakers
		Virtual Reality Headset without built-in speakers
2.	How immersive did you find using your own written or spoken voice with a video game?	Very Immersive
		Somewhat Immersive
		Hardly Immersive
		Not Immersive at All
3.	Did using your written or spoken voice feel intuitive during gameplay?	Very Intuitive
		Somewhat Intuitive
		Hardly Intuitive
		Not Intuitive at All
4.	Compared to classic menu-driven models and dialogue tree options, did this approach feel like progression or regression in terms of video game interaction?	Progression
		Regression
5.	Why do you think that is?	(Open field)
6.	Do you think the approaches used in this game will improve over time to become more viable?	Yes
		No
7.	Do you think this style of technology implementation opens up new design possibilities for games?	Yes
		No
8.	Any other comments?	(Open field)

(Table 4.05: Human-computer interaction questions asked in main experiment)

This final section of the questionnaire focuses on the HCI aspects of the experimental game, including the peripherals used during play and participant

perceptions of immersion, intuitiveness, established interaction approaches, future viability, and design possibilities.

Question 1 asks participants to identify the peripherals they used during the experiment. This provides contextual information concerning the hardware through which participants experienced the prototype.

Questions 2 and 3 examine how immersive and intuitive participants found the use of written or spoken natural-language input when communicating with NPCs. These questions provide participant-centred measures of the experience of using NLI within gameplay, rather than isolating the effects of written and spoken input separately.

Questions 4 and 5 ask participants to compare the interaction approach with traditional menu-driven and dialogue-tree systems. Participants first categorise the experience as either a progression or regression before explaining the reasoning behind their response. Together, these questions provide both a structured evaluation and qualitative context concerning how participants perceived the relationship between NLI and established game interaction approaches.

Question 6 examines whether participants believed approaches such as those used in the prototype could become more viable as the underlying technologies develop. This provides evidence of participant expectations concerning the future development of NLI-based interaction rather than an objective assessment of future technological viability.

Question 7 asks whether participants felt that the implementation opened new design possibilities for video games. This captures participant perceptions of the potential design applications of NLI without treating those responses as evidence that the technology is objectively innovative.

Finally, Question 8 provides an open-text field through which participants could identify additional observations concerning the HCI aspects of the prototype that were not captured by the structured questions.

4.6 Data Analysis Approach

The questionnaire will produce both qualitative and quantitative data that require different but complementary approaches to analysis. Open-text responses will provide detailed observations of participant experiences, while structured questions will provide comparable measures across areas such as engagement, agency,

realism, immersion, intuitiveness, and perceptions of NLI. These forms of evidence will be analysed separately before being considered together in relation to the research questions.

The qualitative analysis will focus on identifying patterns of meaning across participant responses, while the quantitative analysis will retain the descriptive distributions of structured responses and apply inferential statistical tests where these directly contribute to answering the research questions. This approach will allow the study to examine both the direction of participant evaluations and the reasons underlying those evaluations.

4.6.1 Qualitative Analysis Approach

The open-text questionnaire responses will be analysed using reflexive thematic analysis, following the approach established by Braun and Clarke (Braun & Clarke, 2006) and subsequently developed for reflexive qualitative analysis (Braun & Clarke, 2023). This method has been selected because it provides a structured process for identifying patterns of meaning across qualitative data while remaining suitable for the comparatively concise responses expected from a post-play questionnaire.

The analysis will be conducted at a predominantly semantic level, focusing primarily on the meanings directly expressed by participants rather than attempting to infer underlying or unspoken meanings. A combined deductive and inductive approach will be used, and the research questions will provide an initial structure for identifying relevant areas of participant experience, while individual codes and broader themes will also be allowed to develop from the responses themselves.

The analysis will follow the six-phase process described by Braun and Clarke, and responses will first be read repeatedly to establish familiarity with the dataset and identify initial patterns. Meaningful statements or ideas will then be coded, with individual responses able to receive more than one code where they address different aspects of the experience. Related codes will subsequently be compared across questionnaire questions and grouped into candidate themes. These themes will then be reviewed against both the coded responses and the wider qualitative dataset before being refined and named according to the aspects of player experience they represent.

Theme development will not be based solely on the frequency with which an observation occurs. Repeated comments may provide evidence of shared

experiences, but less common responses will also be retained where they provide relevant contrasting or critical perspectives. Responses may also contribute to more than one research question where appropriate, recognising that areas such as conversational freedom, realism, immersion, and NPC responsiveness may overlap within the wider player experience.

As a reflexive approach, the analysis will recognise the interpretive role of the researcher in coding, organising, and developing themes from the participant responses. The purpose will therefore be to provide a transparent analytical account of how patterns within the qualitative evidence relate to the research questions, rather than to establish a single objectively correct coding through inter-rater agreement.

4.6.2 Quantitative Analysis Approach

The structured questionnaire responses will be analysed using a combination of descriptive and inferential statistics. Frequencies and percentages will form the primary presentation of the quantitative data so that the original distribution of participant responses remains visible throughout the analysis. This will be particularly important for the four-point ordered rating scales, where the distinction between stronger and more moderate responses provides useful information about both the direction and strength of participant evaluations.

Inferential statistical testing will be applied selectively to questions that directly contribute to answering the research questions. As the questionnaire primarily produces ordinal or categorical data, exact statistical methods will be preferred where appropriate rather than methods that depend on assumptions of normally distributed or interval-level data. Contextual questions and supporting measures will remain descriptive where additional statistical testing would not meaningfully contribute to answering the research questions.

Where a four-point ordered scale provides a clear positive and negative direction, the two responses at each end of the scale will be grouped for selected inferential tests. For example, responses such as ‘Very’ and ‘Somewhat’ will form one directional category, while ‘Hardly’ and ‘Not at All’ will form the other. This grouping will be used only for inferential analysis, while the original four response categories will remain visible within the descriptive results. Questions already presented as two

distinct responses, such as ‘Yes’ and ‘No’ or ‘Progression’ and ‘Regression’, will be analysed in their original form.

Two-sided exact binomial tests will be used where appropriate to examine whether the observed balance between two directional response categories differs from an equal 50:50 distribution. The 50% value will represent an equal response split for the purposes of the test rather than an assumed population benchmark. A threshold of $p < .05$ will be used when interpreting the statistical results, alongside exact 95% confidence intervals for the observed proportions. Exact confidence intervals will be calculated using the Clopper–Pearson method (Clopper & Pearson, 1934).

The quantitative findings will be interpreted alongside their original descriptive distributions and the qualitative themes rather than being treated independently. Statistical testing will therefore provide additional evidence concerning the strength and consistency of response patterns within the collected dataset, while the qualitative analysis will provide further explanation of the experiences and observations that contribute to those patterns.

4.7 Summary

This chapter has outlined the evaluation methodology for an experimental study designed to explore the use of NLI in narrative game design through NPC interaction. The methodological framework has been developed in response to the areas identified through the literature review and pilot study, with a particular focus on examining the integration of NLI within an RPG environment.

The chapter has defined an approach that combines qualitative and quantitative data collection through a post-play questionnaire. The questionnaire is structured across preliminary participant information, the research game, game design, NLI, and HCI, allowing participant responses to be gathered across the areas addressed by the research questions. Structured response questions provide comparable measures of participant perceptions, while open-text questions allow those responses to be explored in greater detail.

The approach to analysing this data has also been established. Open-text responses will be examined using reflexive thematic analysis to identify patterns of meaning across participant experiences, while structured responses will be analysed using descriptive statistics and selected inferential tests where these contribute directly to answering the research questions. The qualitative and quantitative findings will

subsequently be considered together to provide a broader interpretation of participant responses.

Furthermore, the ethical considerations have been thoroughly defined to ensure the protection of participants' rights and well-being, adhering to the standards set by the University of Staffordshire’s ethics committee. The experimental approach is detailed with precision for the conditions under which the study is conducted, maintaining the integrity and reliability of the data collected.

The upcoming chapter will take the methodological framework discussed in this chapter and detail the actual design and development of the experimental game. It will describe the construction of the game prototype, the integration of NLI technology, and how these elements combine to create a novel narrative gameplay experience. The upcoming chapter will also address the challenges and considerations encountered during the development process, preparing for a deeper understanding of how NLI can enhance narrative depth and player engagement in video games.

Chapter 05: Design and Development

5.1 Introduction

Building on the evaluation methodology detailed in the previous chapter, this chapter focuses on the design and development of the experimental game prototype prepared for participant testing. It documents how the findings from the preceding stages of the research were translated into the design of *Turing* and explains the systems through which natural-language interaction (NLI) was incorporated into a playable RPG environment.

Following this, the second section outlines the aim of the prototype and establishes its purpose as an environment in which participants could communicate with non-player characters (NPCs) using written and spoken natural-language input while completing narrative and gameplay tasks.

Subsequently, findings are revisited from the literature review and pilot study that informed the design requirements of the prototype. These requirements provide the connection between the preceding research and the subsequent development of *Turing*, covering considerations relating to game narrative design, NLI, and human-computer interaction (HCI).

Next, a breakdown presents the content design of the prototype. It begins with the technical requirements and an overview of the game before establishing the core design pillars that informed its development. The section then describes the gameplay systems and mechanics, narrative design, and level design relevant to the experimental experience. Particular attention is given to the NLI implementation, including written and spoken input, NPC responses, conversational history, conversation resetting, and the prompt-engineering process used to provide GPT-4 with character, narrative, spatial, task, and game-state information. The section also explains the HCI and feedback systems used to communicate the different stages of conversational interaction before concluding with an overview of the supporting system architecture. More detailed production documentation relating to conventional gameplay systems, level design, interface development, and other supporting elements is provided in Appendix 3.

The fifth section describes the deployment of the prototype for participant testing, including its packaging as a standalone executable build that could be run separately from the development environment.

Finally, the chapter summarises the principal design and implementation decisions discussed throughout the chapter and establishes the experimental prototype as the environment through which participant perceptions of NLI-driven NPC interaction were investigated. This provides the transition into Chapter 6, which presents and analyses the data collected during the main study.

5.2 Aim of the Prototype

The experimental game, *Turing*, was developed to provide a playable environment in which participants could interact with NPCs using natural-language systems. The prototype presents a narrative setting containing a series of tasks that require players to communicate with NPCs, obtain information, and apply that information through gameplay. Written and spoken natural-language input are incorporated to allow the resulting player experience to be evaluated in relation to the research questions established in Chapter 1.

5.3 Design Requirements from the Pilot Study & Literature Review

The literature review and pilot study established a series of design requirements that informed the development of the experimental prototype. These requirements were organised around the three principal areas of the investigation: game narrative design, NLI, and HCI. The complete set of development considerations is provided in Appendix 3A, while the principal requirements that directly informed *Turing* are summarised below.

Game Narrative Design

The prototype required a role-playing game (RPG) framework in which NPC interaction formed an important part of narrative progression. This required an explorable environment, an established narrative context, player movement and interaction, and tasks that encouraged communication with NPCs. NPCs were also required to fulfil identifiable narrative roles and possess distinguishable personalities, contextual information, and knowledge relevant to their location and purpose within the game. These requirements were intended to provide a suitable narrative context in which more flexible forms of player-NPC communication could be evaluated.

Natural-Language Interaction

The NLI system was required to allow players to communicate with NPCs using free-form written or spoken input rather than relying exclusively on predetermined dialogue options. NPC responses therefore needed to account for player input,

character identity, narrative context, and information relevant to gameplay tasks. Maintaining conversational continuity was also identified as important, together with allowing NPC information to respond where appropriate to changes in player progress. These requirements informed the subsequent implementation of contextual prompting, conversational history, written and spoken input, and dynamic updates to NPC information.

Human-Computer Interaction

The prototype also required interaction systems that made the state of NLI communication understandable to the player. This included providing appropriate feedback when written or spoken input was being received, processed, and returned, while ensuring that the interaction remained integrated with conventional game controls. The interface was therefore designed to support both forms of natural-language input and provide clear visual and auditory feedback during NPC conversations.

Together, these requirements provided the link between the theoretical and preliminary research presented in Chapters 2 and 3 and the practical development of *Turing*. The following sections describe how these requirements were translated into the technical, narrative, gameplay, NLI, and HCI systems used within the experimental prototype.

5.4 Content Design

5.4.1 Technical Requirements

Development Environment

The experimental prototype was developed using Unreal Engine 4.27. The engine provided the Blueprint visual scripting system required to create and integrate gameplay, interface, and NLI functionality within a playable RPG environment. Its support for rapid prototyping also allowed the different systems required by the experiment to be developed and tested within a single application.

Unreal Engine was therefore used as the central development environment through which the narrative, gameplay, HCI, and external NLI services described throughout this chapter were integrated.

Hardware & Peripheral Requirements

A reference hardware specification was established during development using the technical recommendations provided for Unreal Engine 4.27 (Epic Games, 2021).

These requirements provided a baseline for the hardware needed to run the experimental prototype and are summarised in Table 5.01 as follows:

Operating System	Windows 10 64-bit
Processor	Quad-core Intel or AMD, 2.5 GHz or faster
Memory	8 GB RAM
Video Card/DirectX Version	DirectX 11 or DirectX 12 compatible graphics card

(Table 5.01: System requirements for playing the experimental game)

The prototype used conventional mouse and keyboard controls for movement, interaction, and written input. A microphone was additionally required where participants chose to use spoken input, while audio output allowed generated NPC speech to be heard. Spoken interaction was not mandatory because the same NPC interactions could also be initiated through written natural-language input.

A comparison between these requirements and contemporary consumer PC hardware was also conducted during development. The detailed comparison with the Steam Hardware & Software Survey is provided in Appendix 3B, as this information primarily documents the technical planning and reproducibility of the prototype rather than the player-experience investigation itself.

NLI Services

Three external services formed the principal NLI infrastructure used by *Turing*. OpenAI's GPT-4 was integrated through an application programming interface (API) and was responsible for generating NPC dialogue in response to the contextual information and player input supplied by the game. Rather than operating as a standalone conversational assistant, the model was provided with character, narrative, gameplay, and conversational information designed to constrain its responses to the context of the experimental game. The construction of this contextual information and the associated prompt design are discussed later in Section 5.4.7.

Google Cloud Speech-to-Text (STT) was used to support spoken player input. Audio recorded during an NPC interaction was submitted to the service and returned as a text transcription. This allowed spoken and written interaction to enter the same text-based processing structure before being submitted to GPT-4.

Google Cloud Text-to-Speech (TTS) was used for NPC audio output. Text generated by GPT-4 was submitted to the TTS service and returned as synthetic speech, while the original generated text was also presented through the game's interface. This provided a common NPC response across both written and auditory output.

Together, these services created the basic interaction sequence through which written or spoken player input could be interpreted, processed as part of an NPC conversation, and returned to the player. The wider implementation of this process, including conversational history and contextual prompting, is discussed in Section 5.4.7.

Supporting Plugins

Two plugins were used to integrate these external services within Unreal Engine 4.27. An OpenAI integration sourced from Mythen provided Blueprint functionality for submitting text-based API requests and receiving generated responses (Mythen, 2021-Present). Google Speech Kit provided the equivalent connection to Google Cloud's STT and TTS services, supporting the transcription of recorded audio and generation of synthetic speech (Lunin, 2019).

These plugins allowed the required API services to be incorporated through Unreal Engine's Blueprint system and supported the design-focused development approach used for the prototype. Further technical implementation details concerning the plugins and their configuration are provided in Appendix 3B.

5.4.2 Game Overview

RPG Context

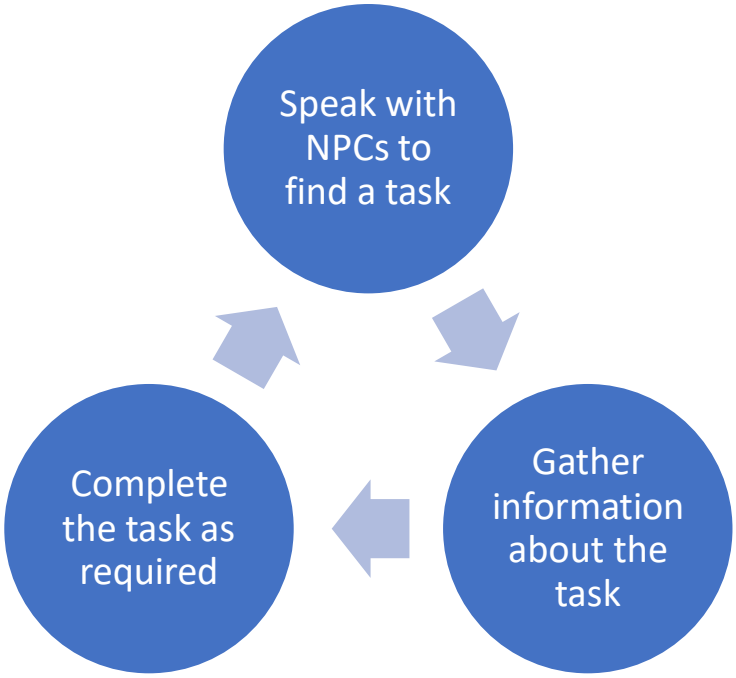
Turing was designed as an RPG prototype because this provided an appropriate context for examining NLI with narrative NPCs. The prototype incorporates a controllable player character, an explorable environment, an established narrative setting, and NPCs that provide information and tasks through conversation. These elements created a gameplay context in which participant interaction with NPCs could form a central part of exploration and progression.

The player experiences the game from a first-person perspective and takes the role of a human maintenance worker visiting the Turing colony. The science-fiction setting is populated primarily by robotic NPCs, providing a narrative context for their

conversational capabilities while also allowing character interaction, world information, and gameplay tasks to be integrated through dialogue.

Game Flow

The core gameplay structure was deliberately straightforward so that participants could begin interacting with NPCs quickly. As illustrated in Figure 5.001 below, players generally progressed by speaking with an NPC, gathering information about a task, completing the required activity, and subsequently continuing their exploration or seeking further interactions.



(Figure 5.001: Core game design loop showing the moment-to-moment gameplay)

This structure allowed conversation to operate as part of gameplay rather than as a separate demonstration of the NLI technology. NPC interaction could provide task instructions, contextual information, worldbuilding, or guidance, while task completion provided opportunities for the game state and subsequent NPC responses to change.

Experimental Presentation

The prototype environment was designed to provide sufficient exploration and narrative context for participant testing while remaining achievable within the scope of the research. A simplified visual style was therefore used, with environmental spaces designed primarily around navigation, NPC encounters, and the tasks included in the experiment.

Physical interaction was also restricted where it was not required by the study. Environmental objects were generally static, NPC collision was limited, and inaccessible areas were blocked to reduce unnecessary navigation problems during the testing session. More detailed information concerning the visual, environmental, and physical design of the prototype is provided in Appendix 3C.

5.4.3 Core Pillars of Design

Before detailing the systems and mechanics implemented within the experimental game, three core design pillars were established to guide development. These pillars provided consistent principles against which subsequent gameplay, narrative, level, and interaction decisions could be considered (Sandham, 2025). They were intended to maintain the focus of the prototype on the research requirements established in the preceding sections, and are defined as follows:

Pillar 01 – Conversationally Driven Interactions

Conversation with NPCs was positioned as a central method through which players could discover narrative information and understand gameplay tasks. The design therefore encouraged players to initiate conversations, formulate their own questions, and use information obtained through NPC interaction to inform their subsequent actions. This pillar supported the study's focus on conversational freedom while retaining an authored narrative and gameplay structure.

Pillar 02 – Ubiquitous Narrative Worldbuilding

Narrative information was distributed across NPC dialogue, environmental design, gameplay tasks, and explorable locations rather than being delivered through a single narrative channel. This was intended to provide multiple opportunities for players to encounter information about the Turing colony while completing ordinary gameplay activities. NPC conversations consequently operated alongside environmental and task-based forms of worldbuilding rather than functioning separately from the wider game.

Pillar 03 – Autonomous Exploration

The prototype was designed to provide players with freedom to explore the available game environment and encounter many of its NPCs and tasks without following a single prescribed sequence. This allowed participants to choose which available

interactions to pursue and provided opportunities for different players to encounter narrative and gameplay information in different orders.

Together, these pillars established the intended relationship between conversation, narrative information, and exploration within *Turing*. They informed the subsequent design of the prototype while allowing the effects of those design decisions on player experience to be examined through participant evaluation.

5.4.4 Gameplay Design – Systems & Mechanics

This section summarises the gameplay systems and mechanics that were directly relevant to the experimental experience. More detailed implementation documentation, including conventional movement, interaction, task, progression, and inventory systems, is provided in Appendix 3D to support technical transparency and replication.

Movement

The prototype uses conventional first-person movement and camera controls to allow participants to navigate the environment and approach NPCs, task locations, and interactive objects freely. This supports the design pillar of autonomous exploration while keeping navigation familiar and secondary to the conversational and narrative systems being evaluated. Additional movement functions, including jumping and sprinting, were included to support general traversal but were not central to the experimental design.

NPCs

NPCs form the primary conversational component of *Turing* and were divided into three categories according to their function and level of conversational capability: Maintenance Bots, Information Bots, and Quest Bots.

- Maintenance Bots use predefined dialogue rather than NLI. Their responses generally communicate their limited conversational capability and redirect the player towards other NPCs. They also contribute to the environmental context of the colony through maintenance-related behaviour and can be affected by

the Reboot Module during one of the gameplay tasks.

- Information Bots use the integrated NLI system and are designed to support free-form conversation. These NPCs are provided with information concerning the wider game world, their own role and location, the player's presence within the colony, and relevant nearby characters or objects. Individual Information Bots can also be assigned distinct personalities and additional contextual information, allowing their generated responses to differ while remaining connected to the same narrative setting.

- Quest Bots also use the NLI system but are directly associated with specific gameplay tasks. Their contextual information includes the problem or task they require the player to address and information that can guide the player towards its completion. Their conversational context can subsequently be updated when the associated task state changes, allowing later responses to reflect actions already completed by the player.

NPC names were also selected with spoken interaction in mind, favouring names that were intended to be recognisable and pronounceable when processed through STT. The complete NPC naming conventions and character list are provided in Appendix 3D.

These categories allowed *Turing* to incorporate both limited scripted characters and more conversationally capable NLI-driven NPCs, while varying the amount and type of narrative and gameplay information available through interaction. The design of the NLI-enabled NPCs, including the contextual information, conversational history, and prompts used to generate their responses, is discussed further in Section 5.4.7.

Interactions

Interaction within *Turing* combines natural-language communication with conventional gameplay interactions. NPCs with NLI capabilities can be addressed through either written or spoken input, with player contributions submitted through the integrated language-processing system and responses generated following API processing. Depending on the NPC, these conversations can provide narrative information, task guidance, contextual information, or more general character interaction.

The Reboot Module provides an additional interaction specifically associated with the NLI system. Introduced during the early stages of the prototype, it allows the player to reset an NPC's conversational state where an interaction becomes unproductive or moves outside the intended context. The mechanic therefore provides an in-world method of restoring the NPC to its default conversational configuration. Its relationship with conversation history and prompt information is described further in Section 5.4.7.

Alongside NPC communication, players can interact with task-related objects, environmental items, monitors, doors, and progression mechanisms. These conventional interactions provide actions through which information obtained from NPC conversations can be applied within gameplay. In several cases, completing an interaction or task also changes the associated game state, allowing subsequent NPC behaviour or dialogue context to reflect player progress.

Keycards

Keycards were used as simple progression and exploration devices within *Turing*. Three were implemented, each serving a different gameplay purpose. The blue keycard introduced the mechanic during the opening section and controlled access from the Administration Building into the wider game space. The red keycard provided a local exploration task associated with access to the Staffordshire University Turing Campus, while the yellow keycard formed part of an NPC-led fetch task that required the player to gather information through conversation.

These keycards therefore provided lightweight gating mechanisms through which exploration, task progression, and NPC interaction could be connected without becoming a primary focus of the experimental design.

Assembly Workshop Task

The Assembly Workshop task requires the player to assist an NPC by guiding a robot through a maze. The task is introduced through conversation with an NPC, who provides the context and instructions before directing the player towards an interactive monitor.

Activating the monitor changes the player's viewpoint from the standard first-person perspective to a top-down view of the maze. The player then uses directional commands to guide the robot towards the exit. Once the robot reaches the destination, the task is completed and the player returns to normal first-person exploration.

This task provides an example of NPC-supplied information being applied through a separate gameplay activity, connecting conversational interaction with task completion.

Calibration Lab Task

The Calibration Lab task requires the player to complete a colour-identification activity after receiving instructions from an NPC. The task is introduced by a robot within the laboratory, who explains the activity and directs the player towards an interactive monitor.

Activating the monitor changes the player's viewpoint to focus on a display and an adjacent NPC. The player is presented with colour words whose written meaning, text colour, and background colour can differ, and must identify the colour in which the word itself is displayed. The nearby NPC provides task instructions and feedback on the player's responses.

The task is completed after five consecutive correct responses, after which the player returns to the standard first-person view. As with the Assembly Workshop, the activity provides a gameplay context in which information delivered through NPC interaction is subsequently applied through a separate task.

Student Essay Task

The Student Essay task is located within the Staffordshire University Turing Campus building and requires the player to locate three missing student essays. The task is introduced by an NPC who explains the situation and asks the player to retrieve the missing items.

The essays are distributed across different rooms within the building, requiring the player to explore the environment to locate them. NPCs positioned throughout the area can also provide clues and directions concerning their locations, allowing conversational interaction to support task completion.

This task therefore combines exploration, item retrieval, and information gathered through NPC conversation.

Translation Disc Task

The Translation Disc task is introduced through an encounter with two NPCs near the administration district. One of the robots communicates exclusively in French, while the second explains that a translation disc required for interpreting its dialogue is missing.

The player is asked to locate the disc within the surrounding environment. Once recovered, the translation function is restored, allowing the previously inaccessible dialogue to be understood.

This task uses communication itself as the basis of the gameplay problem, connecting exploration and item retrieval with a change in how the player can access NPC dialogue.

Shopping District Task

The Shopping District task requires the player to resolve a delivery mix-up affecting several stores. The task is introduced by an NPC who explains that incorrect items have been distributed across the district.

To resolve the problem, the player must speak with the NPCs responsible for the affected shops and determine both what each location originally ordered and what it received instead. The player then uses this information to retrieve and return the appropriate items.

This task links information gathered through conversations with multiple NPCs to a subsequent item-delivery activity, providing another example of NLI being integrated with conventional RPG task progression.

Cosmic Market Exchange Task

The Cosmic Market Exchange task requires the player to obtain a specific item through a sequence of trades with NPC vendors. An NPC positioned at the entrance introduces the task and provides the player with an initial item to begin the exchange process.

Each vendor possesses an item while also seeking a different item in return. The player must therefore speak with the available NPCs to determine their requirements and use this information to complete a sequence of exchanges until the requested item is obtained.

The final item is then returned to the task-giving NPC to complete the activity. This task connects information gathered across multiple NPC conversations with a multi-stage gameplay objective.

Maintenance Bot Task

The Maintenance Bot task requires the player to locate and reboot 25 maintenance robots distributed across the colony. These NPCs use limited scripted dialogue rather than the full NLI system and are characterised by disrupted speech patterns that reflect their deteriorated operational state.

The task is introduced by an NPC near the Cosmic Market Exchange, who asks the player to reboot the maintenance bots using the Reboot Module. Progress is tracked through an environmental display that updates as robots are rebooted.

This task provides an additional gameplay application for the Reboot Module while encouraging exploration across the wider game environment.

Inventory System

The inventory system supports the collection and delivery of items associated with gameplay tasks. The prototype does not provide a conventional quest-tracking interface, meaning that information concerning objectives and required items is primarily obtained through NPC interaction rather than being continuously displayed to the player.

To keep item management simple, the player can carry one task-related item at a time. The currently held item remains visually represented during gameplay, allowing the player to identify what they are carrying without opening a separate inventory interface.

5.4.5 Narrative Design

Story

The narrative places the player in the role of a human maintenance worker visiting the Turing colony, a futuristic settlement originally constructed to support human life with robots serving as assistants. Humans abandoned the colony approximately 20 years before the events of the game, leaving its robotic inhabitants without regular maintenance or software updates. This prolonged absence is reflected through faults including deteriorating speech, memory problems, and difficulties performing particular tasks.

The player's role is to explore the colony, communicate with its robotic inhabitants, and identify problems that can be addressed through gameplay. NPCs provide information concerning their circumstances, the wider colony, and tasks requiring assistance, while some can also direct the player towards other characters or locations.

This narrative premise provides a consistent context for the prototype's gameplay and conversational systems. The player's status as an outsider with limited prior knowledge supports the discovery of information through NPC interaction, while the deteriorated condition of the colony provides narrative justification for the problems and tasks encountered throughout the game.

Game World

The playable environment is divided into four principal areas: the Administration District, Staffordshire University Turing Campus, Shopping District, and Cosmic Market Exchange. Each area provides a distinct narrative and gameplay context while remaining part of the wider Turing colony.

- The Administration District forms the player's initial point of entry and introduces the condition of the colony, its robotic inhabitants, and the principal interaction systems. It also provides access to the wider environment following completion of the introductory sequence.

- The Staffordshire University Turing Campus represents the educational function originally planned for the colony. Its spaces and NPCs provide a distinct narrative setting centred around an abandoned academic environment

and support tasks involving exploration, information gathering, and item retrieval.

- The Shopping District represents the commercial infrastructure originally intended to support the colony's human population. Its NPCs and tasks are structured around individual shops and provide opportunities for the player to gather and apply information across several conversations.

- The Cosmic Market Exchange provides a second commercial environment organised around robot vendors and item trading. Its associated task requires the player to gather information from multiple NPCs in order to complete a sequence of exchanges.

These areas provide different contexts in which NPC dialogue, environmental information, and gameplay tasks can be encountered. Their distinction also supports the provision of location-specific information to NLI-driven NPCs, allowing conversational responses to reflect where individual characters are situated within the game world. Further detail is provided in Appendix 3E.

Characters

The player character is positioned as a human maintenance worker visiting the colony after an extended period of human absence. As an outsider with limited prior knowledge of Turing, the character provides a narrative justification for discovering information through exploration and NPC interaction. This role also aligns the player's objectives with the wider premise of identifying and addressing problems affecting the robotic inhabitants.

The narrative does not include a conventional antagonist. Instead, progression is structured around understanding the condition and needs of the colony's robots and resolving the problems they present. This shifts the primary source of conflict towards investigation, communication, and task completion rather than direct opposition.

The remaining characters are the robotic inhabitants of the colony. As described in Section 5.4.4, these NPCs fulfil different conversational and gameplay functions, including providing contextual information, directing the player towards locations or

tasks, and presenting problems requiring assistance. Their individual roles, personalities, and contextual knowledge also provide the basis for the character information subsequently incorporated into the NLI prompting system.

Narrative Justification

The narrative setting was designed partly in response to the technological characteristics of the NLI systems used within the prototype. *Turing* presents a post-human colony inhabited by robotic characters that have operated without regular human maintenance for approximately 20 years. This provided a fictional context in which characteristics of the implemented technology could be incorporated into the game world rather than treated solely as external technical limitations.

In particular, robotic characters provided an appropriate context for synthetic TTS output, while the deteriorated condition of the colony offered a narrative explanation for behaviours such as disrupted speech, incomplete information, or other irregularities in NPC interaction. Response delays resulting from API processing could similarly be encountered within a setting in which the conversational characters were explicitly artificial rather than human.

This narrative framing was therefore intended to reduce the mismatch between the fictional characters and the technical systems used to represent them. Rather than attempting to simulate human characters directly, the prototype incorporated the characteristics of its NLI implementation into the authored setting and character design. This provided a consistent narrative context in which participant perceptions of NPC interaction, realism, conversational freedom, and immersion could subsequently be evaluated.

5.4.6 Level Design

The level design of *Turing* was structured to support the prototype's three core design pillars while providing participants with repeated opportunities to encounter NPCs, gather narrative information, and complete tasks through exploration. Detailed level layouts, environmental descriptions, and screenshots are provided in Appendix 3F, while this section summarises the elements of the spatial design that directly supported the experimental experience.

Tutorial and Onboarding

The prototype begins within a constrained tutorial environment intended to introduce its interaction systems progressively before the player enters the wider colony. Early encounters use NPCs with limited or predefined dialogue before introducing characters with greater conversational capability. The sequence also introduces conventional environmental interaction, the Reboot Module, and the relationship between NPC communication and gameplay progression.

The tutorial concludes with an elevator sequence that reveals the wider colony and transitions the player from a comparatively linear introductory environment into the more open structure used for the remainder of the prototype. This progression was intended to provide participants with an opportunity to understand the principal interaction methods before being given greater freedom over where to explore and which available characters or tasks to pursue.

Open Exploration

Following the tutorial, the Administration District operates as a central area from which the player can access the wider colony. NPCs, task locations, environmental information, and routes towards other districts are distributed throughout this space, allowing participants to encounter different forms of interaction as they explore. The wider structure includes the Shopping District, Cosmic Market Exchange, and Staffordshire University Turing Campus, each providing a distinct setting for NPC interaction and task completion.

Rather than requiring every activity to be completed through a single fixed sequence, the wider environment provides opportunities for participants to choose between available locations, characters, and tasks. This spatial structure supports the Autonomous Exploration pillar established in Section 5.4.3 while also allowing conversational and narrative information to be encountered in different orders. The Administration District in particular contains multiple NPC types, task locations, and routes into other areas of the prototype.

Spatial Distribution of NPCs and Tasks

NPCs were positioned throughout the game world according to their narrative and gameplay functions. Quest Bots were generally associated with specific tasks or

locations, while Information Bots provided contextual information concerning nearby characters, objects, or points of interest. Maintenance Bots were distributed more widely throughout the colony as part of both the environmental presentation and the associated reboot task.

This distribution created repeated reasons for players to move between locations and communicate with different NPCs rather than relying on a single conversational character. Gameplay tasks were similarly distributed across the environment, linking information obtained through dialogue with exploration, item retrieval, environmental interaction, or task-specific activities.

Relationship Between Level and NLI Design

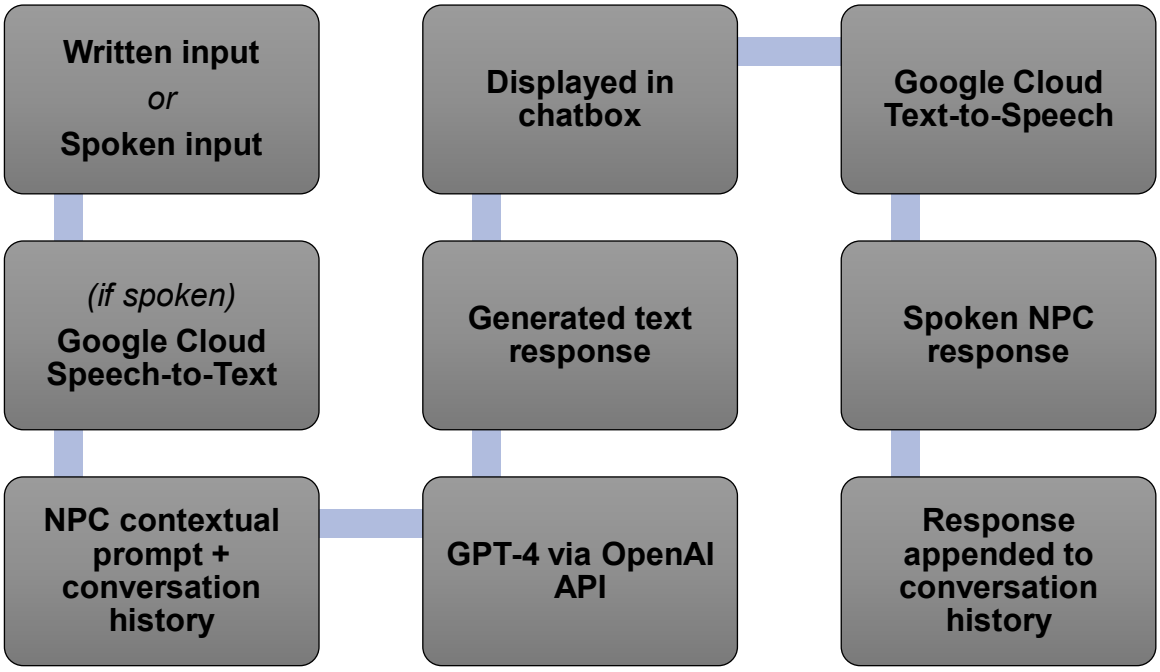
The spatial design also informed the contextual information provided to NLI-enabled NPCs. Individual characters could be supplied with knowledge relevant to their location, nearby objects, other NPCs, and associated gameplay tasks. Consequently, level design and conversational design were treated as connected systems: the physical location of an NPC helped determine the narrative and gameplay information available within its conversational context.

This relationship allowed generated dialogue to remain grounded within the authored structure of the prototype while still supporting free-form player input. The implementation of this contextual information, together with conversational history, game-state updates, and prompt construction, is discussed further in Section 5.4.7.

5.4.7 NLI Design

The NLI system within *Turing* was designed to allow players to communicate with selected NPCs using free-form written or spoken input. Both input methods ultimately entered a common text-based processing structure in which player input was combined with NPC-specific contextual information and conversational history before being submitted to GPT-4. Generated responses were subsequently returned as text and synthetic speech. The following sections describe the input, response, conversational-history, and prompt-design processes used to implement this interaction.

The overall NLI interaction pipeline is summarised in Diagram 5.01, illustrating how written and spoken player input entered the shared text-based processing structure before being returned to the player as text and synthetic speech



(Diagram 5.01: Interaction pipeline within *Turing*)

Written Input

Written interaction is initiated by facing an NLI-enabled NPC and activating the associated chatbox interface. The player can then enter a free-form text response rather than selecting from a predetermined list of dialogue options.

When submitted, the player's text is incorporated into the NPC's existing conversational history and contextual prompt before being sent through the OpenAI API to GPT-4. The resulting generated response is then returned to the game through the response process described later in this section.

Written input therefore provides one of the two routes through which players can contribute natural-language input to NPC conversations, with both written and spoken interaction ultimately using the same text-based NLI processing structure.

Spoken Input

Spoken interaction provides an alternative method of contributing natural-language input to an NLI-enabled NPC conversation. As with written interaction, the player must first face the relevant NPC before initiating communication.

Spoken input is captured by holding the E key, which activates microphone recording for up to one minute. Releasing the key ends the recording and submits the captured audio to Google Cloud STT. The resulting transcription is returned to the game as a text string.

This transcribed text then enters the same conversational process used for written input, where it is combined with the NPC's contextual information and conversation history before being submitted to GPT-4. Spoken and written interaction therefore differ at the point of player input but share the same underlying text-based NLI processing structure.

NPC Response

Following submission of the player's input, GPT-4 generates the NPC response as a text string based on the contextual information, conversation history, and most recent player contribution supplied through the API.

The generated text is returned to the game and displayed through the conversation interface. The same text is also submitted to Google Cloud TTS, which converts the response into an audio file that is subsequently played as the NPC's spoken dialogue.

The response is therefore presented simultaneously as written text and synthetic speech, regardless of whether the player's original contribution was entered through written or spoken input. This provides a consistent output structure across both forms of NLI.

Conversation History

Maintaining conversational continuity required the prototype to preserve information from earlier exchanges between the player and each NLI-enabled NPC. Individual API requests did not inherently retain the content of previous interactions, so submitting only the player's latest contribution would remove the conversational context established earlier in the exchange.

To address this, the prototype maintained a cumulative string variable containing the conversation between the player and the NPC. During development, this mechanism

was referred to as a “false memory”, as it provided the NPC with previously exchanged dialogue without implementing a separate persistent memory system.

When the player submitted a new written or transcribed spoken input, this contribution was appended to the existing conversation-history string. The accumulated history was then included in the subsequent request to GPT-4. Once a response was generated, the NPC's returned text was also appended to the same string, allowing it to form part of the context supplied during the next interaction.

This process allowed subsequent responses to take earlier player contributions and NPC responses into account and provided continuity across a conversation. The conversation history operated alongside the NPC's initial contextual prompt, which established information such as character identity, narrative context, location, and gameplay instructions. The construction of this initial prompt is described later in this section.

Resetting Conversation History

The cumulative conversation-history system also required a method of recovery where an interaction became unproductive or the accumulated context resulted in responses that no longer aligned with the intended conversation. The Reboot Module provided this function within the prototype.

When activated on an NLI-enabled NPC, the module replaced the existing conversation-history string with that character's default prompt. Previous player inputs and generated NPC responses were therefore removed from the context supplied during subsequent API requests, returning the conversation to its initial configured state.

The reset mechanism was incorporated into the fiction of *Turing* through the player's role as a maintenance worker and the robotic nature of the NPCs. This allowed a technical recovery function to be represented as an in-world reboot rather than as an external debugging or interface command.

Prompt Engineering

Prompt engineering was used to translate authored narrative, character, gameplay, and contextual information into instructions that could be supplied to GPT-4 when generating NPC dialogue. The purpose of this process was not to allow the language

model unrestricted control over an NPC, but to provide sufficient information and constraints for generated responses to operate within the authored structure of *Turing*.

A common prompt structure was used across NLI-enabled NPCs, with its contents adapted according to the character and their gameplay function. The structure consisted of five principal components: the initial setup, narrative context, response rules, player or task instructions, and a continuation format linking the prompt to the accumulated conversation history. NPC prompts could additionally be updated in response to changes in relevant game state.

Figure 5.002 demonstrates this structure using the prompt provided to Whiskey, an NPC located within the Shopping District. The example contains information concerning Whiskey's identity and role, the wider Turing narrative, the player's role, nearby locations and businesses, restrictions governing the NPC's responses, task-specific information, and the point at which subsequent conversational history is appended.



(Figure 5.002: Prompt example for the NPC Whiskey)

The first component of the prompt establishes the role that GPT-4 is expected to assume during the interaction. Rather than allowing the model to respond as a general conversational assistant, the setup instructs it to act as a narrative character that the player can communicate with.

Character-specific information is then used to identify the NPC represented by the model. In the Whiskey example shown in Figure 5.002, the prompt identifies the character by name and establishes that Whiskey is one of the robotic inhabitants of the Turing colony. This provides the initial frame through which the subsequent narrative, spatial, and gameplay information is interpreted.

The same underlying structure could therefore be adapted for different NLI-enabled NPCs by changing the character-specific information while retaining the broader instruction that the model should respond from within an authored narrative role.

The next part of the prompt provides the narrative and spatial context required for the NPC to operate within the authored game world. This information establishes the circumstances surrounding the character rather than relying on GPT-4 to infer or invent them independently.

The contextual information includes the wider premise of *Turing*, the player's role within the colony, the NPC's own location and function, and information concerning nearby places or activities relevant to that character. In the Whiskey example shown in Figure 5.002, the prompt explains that the Turing colony was originally built for humans, that its facilities and robots have deteriorated following approximately 20 years without human maintenance, and that the player has arrived as a human maintenance worker.

The prompt also identifies Whiskey's location at the entrance to the Shopping District and names the nearby businesses: Quantum Coffee Company, Virtual Vinyl Vault, and Futuristic Fashion Hub. Providing this location-specific information allows Whiskey's responses to draw from the immediate authored environment rather than treating the NPC as possessing unrestricted knowledge of the wider game world.

This structure therefore links narrative design and level design directly with the NLI system. Worldbuilding establishes the broader fictional context, while spatial

information determines which locations, characters, and gameplay information are appropriate for an individual NPC to reference during conversation.

Response constraints were incorporated into the prompt to define boundaries around what an NPC could appropriately say or do within the authored game context. These instructions were intended to reduce responses that contradicted established narrative information, introduced unsupported details, or implied capabilities that the NPC did not possess within the game.

In the Whiskey example, the prompt limits responses to a sentence or short paragraph and instructs the character not to invent information beyond the context supplied. Whiskey is also instructed to remain at the established location, not to perform gameplay tasks on the player's behalf, and to respond only within the conversational role assigned to the character. Additional formatting constraints instructed the model not to repeatedly introduce the character by name or complete the player's unfinished statements.

These restrictions were particularly important because the language model was capable of generating information beyond the authored content of *Turing*. The prompt therefore combined conversational freedom at the point of player input with constraints over the information and actions available to the NPC. The intention was not to predetermine individual responses, but to establish boundaries within which generated dialogue could vary while remaining connected to the designed character, location, and gameplay context.

Task-specific information was included within an NPC's prompt where that character contributed directly to gameplay progression. These instructions defined what the NPC knew about the associated task, which information could be communicated to the player, and what actions or locations the player should be directed towards.

In the Whiskey example, the prompt establishes that items intended for the Shopping District businesses have been delivered to the wrong locations. Whiskey is instructed to direct the player towards the robots positioned at the affected shops so that further information can be gathered. At the same time, the prompt states that Whiskey cannot recall the individual items involved, preventing the NPC from providing information that was intended to be discovered through subsequent conversations.

The prompt also contains a specific instruction governing an incorrect player claim. If the player states that the delivery task has already been completed, Whiskey is instructed to treat that statement as mistaken and correct the player. This provides a simple example of authored task logic being incorporated into the conversational system so that generated dialogue remains aligned with the intended state of the gameplay activity.

Task information was therefore used to define the NPC's role within a wider sequence of interactions rather than allowing the model to determine task structure independently. The language model could vary how relevant information was expressed, while the underlying objective, knowledge boundaries, and intended progression remained authored by the game design.

The final component of the prompt provides a transition between the authored contextual information and the accumulated conversation history. In the Whiskey example, this is expressed through the instruction that the following text represents the history of the conversation so far.

The stored dialogue between the player and NPC is appended after this point. As described earlier, each subsequent player contribution and generated NPC response is added to the conversation-history string and included in later API requests.

This structure separates the relatively stable authored information concerning character, narrative context, response constraints, and task requirements from the dialogue generated during play. The resulting request therefore combines predefined contextual boundaries with the evolving conversational history of that individual interaction.

The contextual information supplied to an NPC could also be updated in response to changes in relevant gameplay state. This allowed subsequent generated dialogue to reflect task progression rather than continuing to operate from information that was no longer current.

Quest-related NPCs initially used a default prompt containing the information required for their associated task. Following completion of that task, the contextual prompt could be updated to represent the new state. The revised information could, for example, instruct the NPC to acknowledge that the player's objective had been

completed, respond accordingly to the player, and direct attention towards other available characters or activities.

This approach connected authored game-state changes with generated dialogue. GPT-4 did not determine whether the underlying task had been completed independently. Instead, the game altered the contextual information supplied to the model when the relevant gameplay state changed. The language model could then generate responses using the updated state as part of its conversational context.

Dynamic prompt updating therefore provided a limited mechanism through which NPC dialogue could respond to player progress while remaining tied to state changes defined by the wider gameplay systems.

Overall, these prompt components provided a structured method for translating authored character, narrative, spatial, and gameplay information into contextual instructions for GPT-4. The approach combined fixed information and response constraints with accumulating conversation history and selected updates to game state. This allowed generated NPC dialogue to vary in response to free-form player input while remaining connected to the authored characters, locations, tasks, and narrative context of *Turing*.

5.4.8 HCI and Feedback Design

The HCI and feedback systems within *Turing* were designed to communicate the state of player-NPC interaction while allowing written and spoken natural-language input to operate alongside conventional first-person controls. Detailed interface development, control schemes, information architecture, wireframes, menu design, visual feedback systems, typography, animation, and audio implementation are provided in Appendix 3G. This section focuses on the interface elements directly associated with the experimental NLI experience.

Interaction Controls

Conventional keyboard and mouse controls were used for movement and environmental interaction so that the additional NLI functions could be incorporated into an established first-person control structure. Written interaction was accessed through the conversation interface, while spoken input and conversation resetting were assigned dedicated controls.

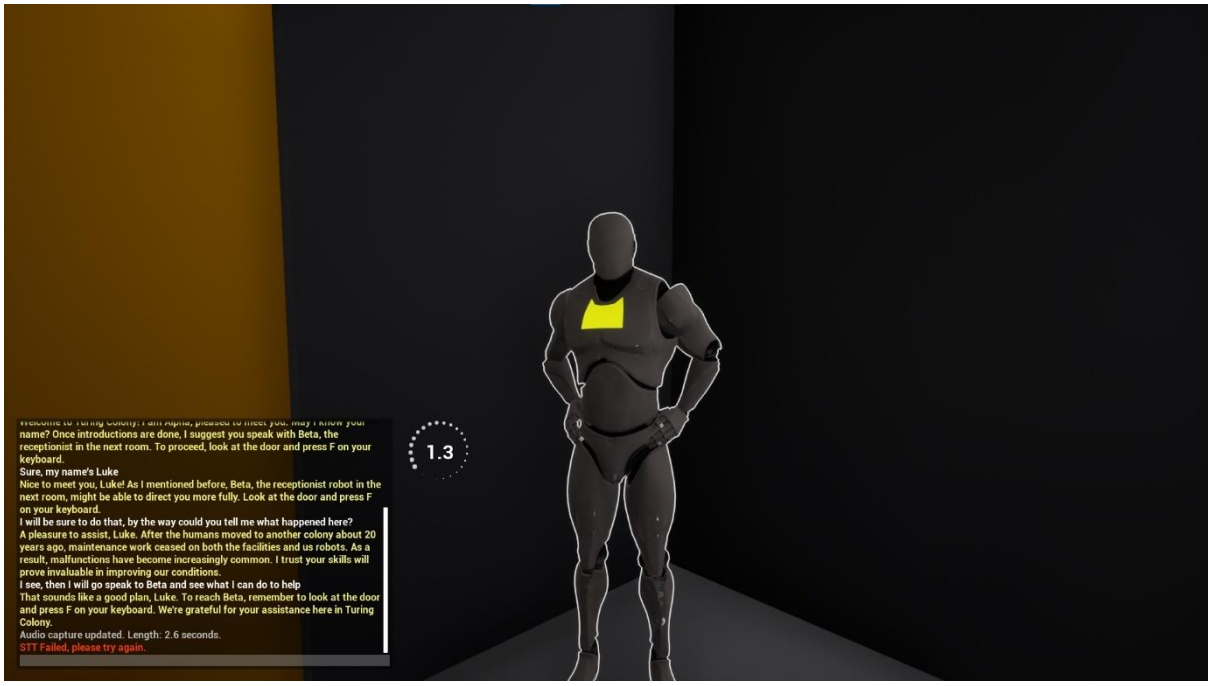
The interaction design therefore separated ordinary traversal and object interaction from the additional controls required for natural-language communication. This allowed participants to move between exploration, conventional gameplay activities, and NPC conversation without requiring a separate interaction mode for the majority of the prototype.

Natural-Language Input Feedback

The HUD provided the principal interface for written and spoken interaction with NLI-enabled NPCs. A conversation window displayed recent player contributions and NPC responses, while a text-entry field allowed players to compose and submit written natural-language input.

Spoken input was accompanied by visual feedback indicating when microphone capture was active. Holding the designated input key activated an on-screen throbber and a numerical counter representing the duration of the recording. Releasing the key ended the recording and removed the active-input state. These elements provided feedback concerning when speech was being captured before the resulting audio was submitted for transcription.

Presenting recent dialogue within the same interface also allowed players to refer back to the immediate conversational exchange while formulating subsequent input. Figure 5.003 shows the implemented HUD and the principal interface elements associated with NLI interaction below:



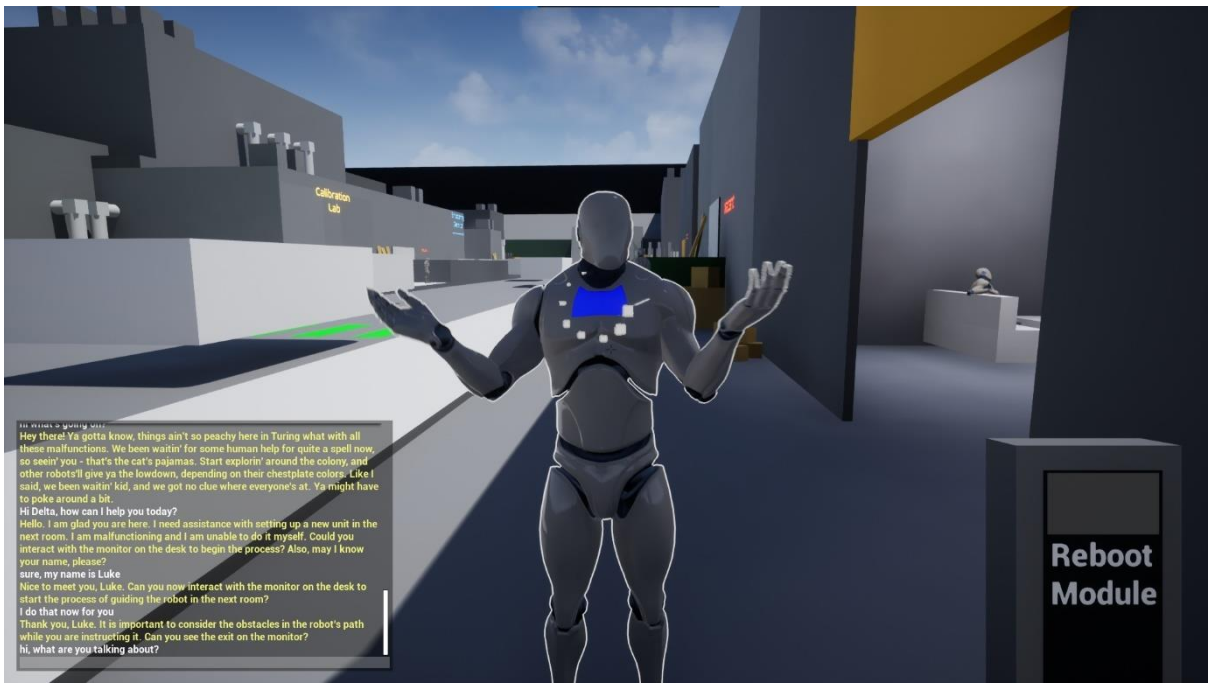
(Figure 5.003: Experimental Game – Player's Heads-up Display)

Conversation Processing & Response Feedback

A separate feedback state was used after player input had been submitted for processing. Because communication with the external services introduced a delay between the player's contribution and the returned NPC response, an additional throbber was displayed in front of the active NPC while the conversational request was being processed.

This indicator provided visual confirmation that the player's input had been received and that the system was awaiting a response rather than remaining inactive. The feedback therefore distinguished the processing period from both the player's input state and the eventual NPC response.

Figure 5.004 illustrates this processing indicator during an NPC interaction. Once the generated response was returned, the processing state ended and the response was presented through the text and synthetic-speech systems described in Section 5.4.7.



(Figure 5.004: NPC Throbber for Interaction Acknowledgement)

NPC & Interaction Identification

Additional visual feedback was used to indicate which characters and objects could be interacted with. Interactive elements could be highlighted when targeted by the player, while NPC visual states provided information concerning their conversational function and current interaction status.

NPC chest plates were used to distinguish different conversational roles within the prototype, while nameplates provided a persistent means of identifying individual characters. During active dialogue, the visual state of the relevant NPC could also change to indicate the source of the current response.

These interface elements supported the broader interaction structure by helping participants identify potential conversational targets and distinguish between NPCs with different levels of conversational capability. More detailed documentation of the colour schemes, object highlighting, environmental signage, task displays, and other interface elements is provided in Appendix 3G.

5.4.9 System Architecture

The prototype was structured using object-oriented Blueprint scripting within Unreal Engine 4.27. Inheritance was used to organise shared functionality across related game objects, allowing common behaviours to be defined within base Blueprint classes and extended by more specialised implementations.

This approach was particularly relevant to the NPC system. A shared ‘NPC_Base’ Blueprint contained functionality used across multiple NPC types, including interaction behaviour, player-facing behaviour, visual interaction indicators, and connections to the external services used for NLI. More specialised NPC classes could then inherit this functionality while incorporating additional behaviours associated with their individual gameplay roles.

Structuring the NPC system in this way allowed the conversational systems described throughout Sections 5.4.7 and 5.4.8 to be incorporated into multiple characters without requiring each NPC implementation to reproduce the complete underlying interaction structure.

5.5 Deployment and Installation

The experimental prototype was packaged as a standalone executable build for use during participant testing. This allowed the game to be launched without requiring Unreal Engine or the associated development environment to be installed on the testing computer.

The packaged build was distributed as a folder containing the executable and its required files. This provided a consistent version of the prototype for use during the

experimental sessions while separating the participant-facing build from the development environment used to create it.

5.6 Summary

This chapter has described the design and development of *Turing*, the experimental RPG prototype created to investigate player experiences of NLI with NPCs. The requirements informing the prototype were derived from the preceding literature review and pilot study and were translated into a playable environment through the design of its technical systems, gameplay mechanics, narrative, level structure, and interaction methods.

The prototype was developed in Unreal Engine 4.27 and incorporated OpenAI's GPT-4 alongside Google Cloud STT and TTS services. These technologies supported written and spoken NLI with selected NPCs while operating alongside conventional RPG mechanics and authored gameplay tasks. The design was structured around conversationally driven interactions, ubiquitous narrative worldbuilding, and autonomous exploration.

Particular attention was given to the implementation of the NLI system. Written and transcribed spoken player input entered a common text-based processing structure, while cumulative conversation history provided previous dialogue as context for subsequent interactions. Prompt engineering was used to translate authored character, narrative, spatial, and gameplay information into contextual instructions for GPT-4. The resulting prompt structure incorporated character setup, narrative and spatial context, response constraints, task-specific information, conversation history, and selected updates reflecting changes in game state. This approach allowed generated dialogue to vary in response to player input while remaining connected to the authored structure of the prototype.

HCI and feedback systems were also incorporated to communicate the different stages of conversational interaction, including written input, speech recording, request processing, and generated responses. Supporting systems such as the shared NPC Blueprint architecture provided the technical structure through which these interactions were implemented across multiple characters, while the standalone build was used during participant testing. Detailed production documentation relating to conventional gameplay systems, level design, interface development, and other supporting elements is provided in Appendix 3.

The completed prototype therefore provided the experimental environment through which participant perceptions of NLI-driven NPC interaction could be investigated. Chapter 6 presents the results of the main study and examines participant responses in relation to the research questions.

Chapter 06: Results and Data Analysis

6.1 Introduction

Following on from the previous chapter, which detailed the design and development of the experimental game *Turing*, this chapter focuses on the results of the main experimental study and the data collected from its 22 participants.

The second section introduces the questionnaire results and outlines the dataset produced through the playtesting stage. It establishes the consistent testing conditions used across participants and briefly reiterates the complementary qualitative and quantitative approaches used to analyse the questionnaire data.

In the third section, the chapter presents the participation analysis and discussion. The results are initially organised according to the questionnaire structure, covering preliminary participant information, the research game, game design, natural language interaction (NLI), and human-computer interaction (HCI). Structured responses are presented through frequencies and percentages, with selected measures subjected to inferential statistical testing where they contribute directly to the research questions. Open-text responses are also examined through reflexive thematic analysis, with analytical syntheses drawing together the relevant evidence for each of the four research questions.

The fourth section draws these findings together across the research questions. Rather than considering the questionnaire sections independently, this section identifies wider relationships between conversational freedom, narrative agency, NPC realism, contextual responsiveness, immersion, intuitiveness, and the game-design possibilities associated with NLI.

Finally, the chapter concludes with a summary of the principal findings of the chapter and establishes the basis for the final chapter. The following discussion will consider the wider implications of the results, revisit the research questions and objectives, identify the study's contributions and limitations, and consider opportunities for future research.

6.2 Questionnaire Results

The playtesting stage produced a dataset of responses from 22 participants. Each participant engaged with the experimental game under the same controlled testing conditions, including the provision of equivalent hardware, software, and peripheral

setups. Participants were also allocated the same 30-minute period in which to interact with the game before completing the post-play questionnaire.

Maintaining consistent testing conditions reduced variation introduced by the testing environment and provided a common basis from which participant experiences could be compared. The resulting dataset captured responses concerning the research game, narrative and game design, NLI, and HCI, reflecting the areas established through the questionnaire design in Chapter 4.

As established in Chapter 4, the questionnaire produced both qualitative and quantitative data that were analysed using complementary approaches. Open-text responses were examined through reflexive thematic analysis, while structured responses were presented descriptively through frequencies and percentages, with selected questions subjected to inferential statistical testing where they directly contributed to the research questions. The following sections present these results before drawing the findings together in relation to the four research questions.

6.3 Participation Analysis & Discussion

6.3.1 Section 01 – Preliminary Questions

Similar to the pilot study in Chapter 3, question 1 served as an initial eligibility check to confirm that participants played video games. All 22 participants answered positively and were therefore retained within the dataset, with the results presented in Figure 6.01 of Appendix 4A.

Figure 6.02 of Appendix 4A presents the responses to Question 2 concerning participants' weekly gaming activity. The largest group, representing 27.27% of participants, reported playing video games for between 4 and 8 hours per week. This was followed by 22.73% who reported playing for between 8 and 12 hours, while 18.18% reported between 0 and 4 hours. Collectively, 68.18% of participants reported playing for 12 hours or fewer per week, with the remaining 31.82% reporting more than 12 hours. This demonstrates that the participant group included a range of levels of regular gaming activity.

Question 3 allowed participants to list the types of games they commonly played. As participants could provide multiple responses, the answers were cleaned and organised into recurring genre categories. The ten most frequently identified categories are presented in Table 6.01 below.

Genre	Entries
Role-Playing Game	14
Adventure	10
Action	9
Shooter	9
Simulation	8
MMO	5
Puzzle	5
Platformer	4
Strategy	4
Roguelike	4

(Table 6.01: List of genres played as indicated by participants)

Across the 94 genre entries recorded, role-playing games (RPGs) were the most frequently identified category, appearing 14 times and accounting for 14.89% of all genre entries. Adventure games followed with 10 entries, while action and shooter games each received 9. As 14 of the 22 participants included RPGs among the genres they played, 63.64% of the participant group reported some familiarity with the genre used as the basis for the experimental game. This makes the data more relevant due to the experiment's methodology being specifically structured around an RPG experience. The broader range of responses also demonstrates that participants engaged with a variety of other game genres rather than representing an exclusively RPG-focused sample, creating wider insights for the data set.

Question 4 of Appendix 4A recorded participant age using predefined ranges grouped into decade-based categories commonly associated with adulthood. The distribution of age data is presented in Table 6.02 below:

Age Range	Entries
21 to 30	10
31 to 40	7
20 or Under	2
41 to 50	2
51 to 60	1

(Table 6.02: Age ranges of testing participants)

The largest age group was 21 to 30, representing 45.45% of the sample, followed by participants aged 31 to 40 at 31.82%. Participants aged 20 or under and 41 to 50 each represented 9.09%, while one participant, representing 4.55%, was aged between 51 and 60. The sample therefore included participants across several adult age groups, although it was concentrated primarily between the ages of 21 and 40.

Figure 6.05 of Appendix 4A presents the results of Question 5, where participants were asked to anonymously indicate the gender they identify with. The distribution of responses is shown in Table 6.03 below:

Gender	Entries
Male	16
Female	4
Non-Binary	2

(Table 6.03: Gender indication of testing participants)

Of the 22 participants, 72.73% identified as male, 18.18% as female, and 9.09% as non-binary. The sample was therefore predominantly male, which should be recognised when considering the extent to which the participant group represents a wider player population.

Finally, Question 6 asked whether English was the participant's first language, and 100% of the participants confirmed that it was. This provided a consistent first-language baseline within the sample, which is particularly relevant to a study centred on written and spoken NLI. However, this does not establish that language comprehension or individual communication differences had no influence on participant interaction with the system.

6.3.2 Section 02 – Research Game

Question 1 in this section asked participants to describe their first impressions of the experimental game, as detailed in Appendix 4B. For an initial descriptive overview, the responses were organised according to their general sentiment, as presented in Table 6.04 below. This categorisation is used to summarise the responses at question level and is distinct from the thematic analysis presented later in this chapter.

First Impressions	Entries
Positive	20

Mixed	2
Negative	0

(Table 6.04: First impressions)

Of the 22 participants, 20 responses were categorised as positive and two as mixed, representing 90.91% and 9.09% of the sample respectively. No response was categorised as entirely negative. Subsequently, the individual observations contained within these responses were also organised into recurring descriptive categories, presented in Table 6.05:

Detailed First Impressions	Entries
Interesting, Fascinating, Impressive, Intriguing	11
Fun, Enjoyable	6
Sense of Freedom, Agency	6
Reactive, Engaging, Interactive NPCs	5
Motivated to continue playing	4
Promising, Innovative	4
Interactions felt natural	3
Easy to navigate	2
Intuitive	2
Easy to control	1
Immersive	1
Varied Gameplay	1
Lacking specific interactions	1
Slow NPC Speech	1

(Table 6.05: Key feedback drawn from first impressions)

The most frequently identified first-impression category concerned participants describing the game as interesting, fascinating, impressive, or intriguing, appearing in 11 responses. Six participants referred to the experience as fun or enjoyable, while six also commented on a sense of freedom or agency. Five participants specifically referred to the NPCs as reactive, engaging, or interactive, with other observations concerning motivation to continue playing, perceived innovation, natural interaction, navigation, intuitiveness, and immersion.

The mixed responses also contained points of friction, including slow NPC speech and limitations in particular interactions. These comments indicate that positive first

impressions could coexist with concerns about specific elements of the interaction rather than forming exclusively positive or negative experiences. Some issues are primarily related to user experience (UX) design and could be addressed with minor updates or clearer guidance on available interactions. Overall, these criticisms were limited in frequency and occurred alongside predominantly positive first impressions.

Question 2 asked participants what they specifically enjoyed about the experimental game. As participants could identify multiple elements within a single response, the comments were organised into recurring descriptive categories, presented in Table 6.06:

Enjoyable Elements	Entries
Conversing With NPCs	17
NPC Personalities Had Depth	8
Conversations Felt Natural/Easy	6
Interesting World Building	6
NPCs Gave Reasons to Explore	5
Asking Questions Felt Good	5
Solving Puzzles via NPC Interaction	5
Flow Felt Good	3
NPCs Kept Player on Track	3
NPCs Always Had Unique Answers	2

(Table 6.06: Highlighted Aspects Enjoyed by Participants)

The data revealed sixty responses distributed across ten categories. Conversing with NPCs was the most frequently identified source of enjoyment, appearing in 17 of the 22 responses. Eight participants referred to the depth of NPC personalities, while six commented on the natural or easy quality of conversations and six highlighted the game's worldbuilding. Five responses referred to NPCs encouraging exploration, five identified enjoyment in asking questions, and five discussed solving puzzles through NPC interaction.

These responses show that enjoyment was frequently associated with the conversational NPC systems, but also with how those systems connected to exploration, puzzle solving, characterisation, and worldbuilding. This relationship between NLI and the wider game and narrative design becomes important within the thematic analysis of RQ1 later in this chapter.

In equal measure to the above question, question 3 follows up by asking players what they did not enjoy about the experimental game. As with the previous question, responses could contain more than one observation and were organised into recurring descriptive categories, presented in Table 6.07:

Disliked Elements	Entries
NPC Responses Took Too Long to Load	5
NPC Responses Felt Limited or Repetitive	4
Forgot Core Details	3
Tutorialisation Not Clear Enough	3
Mechanics Were Not Impactful Enough	2
NPCs Spoke Too Much	2
Tasks Felt Repetitive	2
Desired More Conversational Support	2
Not all NPCs Were Interesting	1
NPCs Without NLI Were Disappointing	1
Items Were Visible Before Needing Them	1
Tasks Unrelated to NPCs Felt Boring	1
Game Required Too Much Attention	1
NPC Speech Would Sometimes Glitch in Pronunciation	1
Desired More Human-Like Interactions	1
Directions Were Not Clear Enough	1
Could Not Trick NPCs	1
Getting Information from NPCs Felt Harder Than Normal Games	1
Desired More Information on the Overall Narrative	1

(Table 6.07: Highlighted Aspects Disliked by Participants)

The most frequently reported issue concerned the time taken for NPC responses to load, identified by five participants. Four participants described NPC responses as limited or repetitive, while three referred to difficulties remembering core information and three identified a need for clearer tutorialisation. Other observations concerned dialogue length, task repetition, conversational support, mechanical impact, pronunciation errors, navigation, and the availability of information.

Although many of the individual concerns occurred only once or twice, they remain relevant to understanding the participant experience. In particular, response delay

and perceived conversational repetition appeared across several responses and relate directly to the quality and flow of NLI-driven interaction. Less frequent comments are also retained because the qualitative analysis does not treat frequency alone as an indication of analytical importance.

Interestingly, several responses to Question 3 also combined criticism with positive observations. For completeness, these additional comments are summarised descriptively in Table 6.08:

Reiterated Positive Sentiments	Entries
Players Wanted More	2
NPC Interactions Were More Interesting	1
Objectives Became Clearer Over Time	1
Conversing with NPCs was Enjoyable	1
The Experience was Engaging	1

(Table 6.08: Reiterated Positivity from Participants)

These responses illustrate that criticism of particular design or technical elements did not necessarily correspond with an entirely negative evaluation of the experience. Some participants simultaneously identified areas of frustration while expressing enjoyment, engagement, or a desire to continue playing.

Question 4 in Appendix 4B asked participants to identify the activities they completed during the 30-minute session. Participants could report multiple activities, producing 71 entries across the seven activity categories shown in Table 6.09:

Activities	Entries
Assembly Workshops	18
Cosmic Market Exchange	12
Calibration Labs	11
Student Essay Retrieval	10
Shopping District	10
Robot Rebooting	6
Translation Disc Recovery	4

(Table 6.09: Activities completed by participants)

The assembly workshops were the most frequently reported activity, completed by 18 participants at 81.82%. The cosmic market exchange was reported by 12

participants at 54.55%, followed by the calibration labs by 11 at 50%. Student essay retrieval and the shopping district activities were each reported by 10 participants at 45.45% each, while robot rebooting was reported by six at 27.27% and translation disc recovery by four at 18.18%.

These differences can be considered alongside the structure of the experimental game. The assembly workshop is positioned as an early activity after the tutorial, while several of the more frequently completed tasks occupy larger or more visually prominent areas of the environment. By contrast, robot rebooting and translation disc recovery are located in less prominent areas. The results therefore provide useful context for the range of game content encountered by participants during the limited play period, although they do not establish that location or visual signposting alone determined task completion.

Question 5 asked participants whether they had played a game similar to the experimental game presented in this test. The responses are shown in Table 6.10, as follows:

Similar Game Played?	Entries
No	19
Yes	3

(Table 6.10: Previous Experience with Games Similar to the Experimental Game)

Of the 22 participants, 19 at 86.36% reported that they had not previously played a similar game, while the remaining three, at 13.64%, indicated that they had. Within this sample, the experimental game therefore represented an unfamiliar type of experience for most participants.

This result provides useful context for the subsequent questions concerning interest, recommendation, and perceptions of the interaction design. However, the response should be interpreted as participants' own assessment of similarity rather than as evidence that comparable games do not exist. The finding therefore indicates limited prior exposure within the sample rather than establishing the objective novelty of the experimental game. This result is also particularly relevant for interpreting responses to the following questions, as it provides context for how participants react to the experimental game’s relatively unique design and mechanics.

As a follow-up, question 6 asked whether the research contributors would like to see more games like the experimental game they had just played. The responses are shown in Table 6.11:

Desire For More Games Like This	Entries
Yes	22
No	0

(Table 6.11: Want for More Games Like the Experimental Game)

All 22 participants indicated that they would like to see more games similar to the experimental game. This represents a 100% positive response within the sample and provides direct evidence of participant interest in further games using a comparable design approach.

In accordance with the quantitative analysis approach established in Section 4.6.2, this binary response was examined using a two-sided exact binomial test against an equal 50:50 response distribution. The observed result of 22 positive responses from 22 participants differed significantly from an equal distribution, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0% for the positive response proportion.

This result indicates that responses within the sample were strongly concentrated towards wanting to see more games of this kind. However, it should be interpreted as evidence of participant interest within the study sample rather than as a measure of wider market demand or commercial viability, despite the promising outcome.

To assess the appeal of the experimental game's design, participants were asked how interested they would be in a game that utilised a similar approach to design. The responses are presented in Table 6.12:

Interest In Games Design Like This	Entries
Very Interested	12
Somewhat Interested	10
Hardly Interested	0
Not Interested At All	0

(Table 6.12: Interest in Games with a Design Like the Experimental Game)

All 22 participants responded positively, with 12 at 54.55% indicating that they would be very interested and 10 at 45.45% somewhat interested. No participants selected either of the negative response options.

For inferential analysis, the ‘Very Interested’ and ‘Somewhat Interested’ responses were grouped as positive, while ‘Hardly Interested’ and ‘Not Interested At All’ formed the negative category, in accordance with the approach established in Section 4.6.2. A two-sided exact binomial test showed that the observed 22 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0% for the positive response proportion.

The result demonstrates that interest within the sample was consistently directed towards games using a similar design approach. As with Question 6, this finding describes the responses of the study participants and, although very positive, should not be interpreted independently as evidence of wider audience demand or commercial viability.

Building on Question 7, Question 8 asked participants to explain why they had selected their level of interest in games using a similar design approach. As participants could raise multiple points within a single response, the comments were initially organised into descriptive categories to provide a question-level overview. These categories are distinct from the reflexive thematic analysis presented later in this chapter. The positive observations are summarised in Table 6.13:

Positive Points	Entries
Potential to Create Unique or Immersive Scenarios	10
Interested in Narrative Possibilities	7
Gameplay is Fun, Engaging, or Novel	5
Drawn to the Narrative Discovery	4
Conversation is Convincing, Impressive, or Believable	3
Enjoyed the Level of Freedom	3
Enjoyed the Natural Progression	2
Interested in Natural Language Interaction	2
World Felt More Alive	1
Provides a Modern Twist to the Feel of Old Adventure Games	1
Positive Learning Curve	1

(Table 6.13: Positive Player Comments on More Games Like the Experiment)

Across the 22 responses, 41 positive observations were identified. The most frequently occurring category related to the potential to create unique or immersive scenarios, appearing 10 times, followed by interest in narrative possibilities with seven entries. Five observations described the gameplay as fun, engaging, or novel, while four referred specifically to narrative discovery. Participants also commented on conversational believability, freedom, natural progression, worldbuilding, and interest in NLI itself.

These responses provide further context for the uniformly positive interest ratings reported in Question 7. In particular, participants often described their interest in terms of what NLI might enable when combined with wider narrative and game design. For example, responses referred to discovering information through self-generated questions, shaping interactions more freely, exploring narrative possibilities, and creating experiences that felt less dependent on predefined dialogue options.

The responses also contained several reservations despite all participants having selected a positive level of interest in Question 7. These observations are summarised in Table 6.14 as follows:

Points of Concern	Entries
Art Style is Unappealing	1
Game Needs More Polish	1
Distracted by Making AI say Speak Abnormally	1
Some Nuances of Natural Language Feels Lost	1
More Direction Needed with What to say	1
Natural Language is Impressive but Could not Carry a Game	1
Conversation not Beneficial Compared to Traditional Approaches	1

(Table 6.14: Player Concerns on More Games Like the Experiment)

The concerns were varied and each occurred once within the descriptive coding. Some related to the wider presentation of the prototype, including visual style and the need for further polish, while others concerned NLI more directly. These included loss of nuance in natural language, uncertainty about what to say, and questions about whether unrestricted natural-language interaction offered sufficient benefit over established dialogue approaches.

These less frequent responses remain relevant despite their low occurrence. One participant, for example, found the unrestricted dialogue less beneficial than standard options, while another felt that NLI would need to be supported by additional narrative and gameplay content rather than carrying a game independently. Another participant identified a need for clearer narrative direction when deciding what questions to ask.

The presence of these concerns alongside positive interest ratings demonstrates that participant interest did not necessarily correspond with unqualified approval of every aspect of the interaction design. This distinction is retained within the later thematic analysis, where positive and critical observations are considered together rather than being weighted solely according to frequency.

The final comments in response to question 8 included additional points that were neither strongly positive nor particularly concerning. While these comments provide limited additional insight into the experimental game's design, they are presented here for transparency. These responses are shown in Table 6.15:

Other Points	Entries
Interested to See a Full Development Cycle	1
Not the Genre Normally Played	1

(Table 6.15: Other Player Comments on More Games Like the Experiment)

One participant expressed interest in seeing how the concept would develop through a complete production cycle, while another noted that the experimental game was outside the type of genre they would normally play. These comments provide additional context for individual responses without being treated as broader patterns within the dataset.

Next, question 9 asked participants how likely they would be to recommend games like the experimental one to a friend. The results are shown in the following Table 6.16:

Recommendation Likeliness	Entries
Very Likely	16
Somewhat Likely	6
Hardly Likely	0
Not Likely At All	0

(Table 6.16: Likeliness to Recommend Games Like the Experiment to a Friend)

Question 9 asked participants how likely they would be to recommend games using a similar design approach to a friend. All 22 participants responded positively, with 16 at 72.73% indicating that they would be very likely to recommend such games and six at 27.27% somewhat likely. No participants selected either of the negative response options.

For inferential analysis, the 'Very Likely' and 'Somewhat Likely' responses were grouped as positive, while 'Hardly Likely' and 'Not Likely At All' formed the negative category. A two-sided exact binomial test showed that the observed 22 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0% for the positive response proportion.

This result demonstrates that willingness to recommend games using a similar design approach was consistently positive within the participant sample. When considered alongside Questions 6 and 7, the findings show a consistent pattern of participant interest, including a desire to see more games of this kind, personal interest in playing a released game using a similar design, and willingness to recommend comparable games to others.

For the final question in section 2, participants were provided a final open-text opportunity to share any additional observations about the experimental game they believed to be noteworthy at this stage. As with previous open-ended questions, the responses were organised into descriptive categories to provide a question-level overview. These categories are separate from the reflexive thematic analysis presented later in the chapter. The first set of positive comments are presented in Table 6.17:

Positive Comments	Entries
Really Interesting	2
Left Wanting More	2
Joyful Experience	2
Subverted Expectations	1
Natural Language Adds a New Dimension	1
Liked the French NPC	1

Surprised how Cool the Speech Was	1
Would Like Others to Play so Could Discuss and Compare Experiences	1
Great Design	1
Fantastic Scope	1
Love the Concept	1
Absolutely Brilliant	1
Very Thought-Provoking	1

(Table 6.17: Additional Positive Comments)

Sixteen positive observations were identified across the responses, with several participants describing the experience as interesting, enjoyable, or thought-provoking, while others expressed a desire to continue playing. Additional comments referred to the speech interaction, specific NPC encounters, the scope of the game, and the broader concept behind the prototype.

These responses reinforce several observations made earlier in Section 02, particularly around participant curiosity, enjoyment, and interest in continuing with the experience. One participant also expressed interest in comparing their experience with those of other players, suggesting curiosity about how the conversational system might respond differently across individual playthroughs.

Additionally, some comments of concern were also reported in response to question 10, and have been summarised in Table 6.18, as follows:

Concerned Comments	Entries
NPCs Talk Too Much	2
NPC Replies are a Little Long	2
Pressing Enter to Type was Annoying and Should be Automatic Upon Typing Text	1
UI Could Help with Remembering Tasks, or a Notepad System to Store Information	1
Some Technical Errors in the NPC Speech	1
Occasional Technical Bug	1
Not Sure Conversation Loading Delay Makes for Natural Conversation	1

(Table 6.18: Additional Concerned Comments)

The most recurring concerns related to dialogue length, with participants describing NPC responses as either too long or containing too much information. Other observations concerned the need to repeatedly activate the text-entry field, limited support for remembering tasks, occasional speech or technical errors, and delays in receiving conversational responses.

These comments identify several points at which the surrounding interface and technical implementation could interrupt conversational flow. Importantly, their relatively low frequency does not establish that other participants were unaffected by these issues, as the question invited participants to report whichever observations they considered most relevant rather than systematically rating each potential problem.

The responses therefore provide useful evidence of friction within an otherwise positively received experience. Dialogue length, response delay, and interface requirements are particularly relevant because they affect the immediacy and continuity of interaction with the NPCs, and these observations are retained within the later thematic analysis.

Finally, the remaining comments contained observations that did not fit clearly within the preceding descriptive categories and are presented in Table 6.19:

Other Comments	Entries
I Imagine Verbal Interaction Would be a Different Experience Compared to Written Interaction	1
Happy to Help Develop the Visuals	1
Looks Like We're Close to Interacting in Ways Seen in Fiction (Holodeck)	1
Interested to see how This Technology is Used in Non-Gaming	1

(Table 6.19: Additional Other Comments)

These comments included a distinction between written and spoken interaction, an offer to contribute to further visual development, a comparison with fictional conversational interfaces, and interest in possible non-gaming applications. Although these observations are varied, some remain relevant to the wider research. In particular, the distinction between written and spoken interaction anticipates later feedback concerning how input method and play environment can influence the experience of NLI.

6.3.2.1 Research Question 1 Analytical Synthesis

Research Question 1: *How do players perceive and engage with an NLI-driven RPG, and what factors influence their enjoyment, interest, and willingness to recommend such a design?*

As established in Section 4.6.1, the open-text questionnaire responses were analysed using reflexive thematic analysis at a predominantly semantic level. For RQ1, responses from Section 02 Questions 1, 2, 3, 8, and 10 were considered across the dataset rather than as isolated questionnaire items. Initial semantic codes were generated from meaningful statements within the responses before related codes were compared and grouped into broader patterns of meaning. These patterns were subsequently reviewed and refined into four themes relevant to RQ1. The full participant-level semantic coding and its relationship to the final themes is provided in Appendix 5A.

The descriptive categories presented earlier in Section 6.3.2 provide question-level summaries of participant responses and should therefore be distinguished from this thematic analysis, which examines patterns across the qualitative dataset. Table 6.20 summarises the four themes developed for RQ1 and provides examples of the semantic codes that contributed to each theme.

Theme	Illustrative Semantic Codes
Conversational Freedom Encouraged Exploration and Discovery	Freedom to ask self-selected questions; exploration through conversation; narrative discovery; testing conversational boundaries; freedom from predefined dialogue; player-authored questions; experimentation with NPC responses
Responsive NPCs Supported Engagement and Believability	NPCs reacted to player-authored dialogue; unexpected responses; distinct NPC personalities; relevant responses; natural interaction; dynamic conversation; contextual responsiveness; believable character interaction
NLI Was Most Appealing When Integrated with Wider Game and Narrative Design	Conversation supported puzzles; dialogue encouraged exploration; NPCs provided worldbuilding; conversational quests; NLI supported narrative

	progression; interaction connected with wider gameplay; desire for greater story and character depth
Technical and Interaction Friction Disrupted Conversational Flow	Response delays; overly long responses; repetitive dialogue; limited responses; speech and pronunciation errors; unclear conversational direction; interface interruptions; difficulty retaining information; unnatural turn-taking

(Table 6.20: RQ1 Themes and Illustrative Semantic Codes)

The quantitative findings show a consistently positive pattern of interest within the participant sample. All 22 participants stated that they would like to see more games using a similar design approach, all 22 expressed either very or somewhat positive interest in a released game of this kind, and all 22 indicated that they would be very or somewhat likely to recommend similar games to a friend. Each of these distributions differed significantly from an equal positive and negative response split through two-sided exact binomial testing, $p < .001$. These results are supported by the initial responses to the game, where 20 of the 22 participants provided predominantly positive first impressions. However, the open-text responses provide greater insight into the factors underlying this interest and reveal both positive experiences and points of friction.

The reflexive thematic analysis of the open-text responses produced the following four themes relevant to RQ1.

1. **Conversational Freedom Encouraged Exploration and Discovery**

Participants frequently described the ability to construct their own questions and responses as an important part of their engagement with the game. Rather than selecting from predefined dialogue choices, players could decide what information they wanted to pursue and how they wanted to approach an NPC. This encouraged experimentation, exploration, and curiosity about both the characters and the wider game world. Participants described asking lateral questions, testing the boundaries of conversations, discovering quests through dialogue, and using NPCs to investigate the history and setting of the colony.

This freedom also changed how information was discovered. Several participants contrasted the experience with traditional dialogue systems where the available topics are signposted through predetermined options. Within Turing, progression

could instead depend on deciding what questions were relevant and how information might be uncovered through conversation. One participant described this as being “more down to you to ask the right questions to learn about the world”, while another connected conversational interaction directly with exploring secrets, mysteries, and lore. This suggests that conversational freedom supported engagement not only through expression, but by becoming part of the process of exploration and narrative discovery.

2. **Responsive NPCs Supported Engagement and Believability**

A second theme concerned the perceived responsiveness of NPCs. Participants commonly described enjoyment in seeing how characters would react to their questions, phrasing, and attempts to challenge the conversational system. Responses also referred to character personalities, contextual information, and NPCs providing answers that were not always anticipated by the player. Some participants actively attempted to confuse, manipulate, or test NPCs to discover the limits of their behaviour.

These qualities contributed to perceptions of the NPCs as more engaging and less predictable than fixed dialogue interactions. Participants described conversations as natural, dynamic, believable, or capable of making the world feel more alive. The ability of characters to respond to player-authored input therefore appears to have supported engagement through a combination of curiosity and perceived responsiveness. This did not mean that NPC behaviour was consistently perceived as human-like, but rather that participants valued interactions that appeared to respond meaningfully to what they had chosen to say.

3. **NLI Was Most Appealing When Integrated with Wider Game and Narrative Design**

Participant interest was not based on conversational technology in isolation. Responses regularly connected NLI with puzzles, worldbuilding, characterisation, exploration, quests, and narrative discovery. For example, participants enjoyed using conversations to solve problems, locate information, discover activities, and learn more about the colony and its characters. This indicates that NLI was valued when it contributed directly to existing game and narrative structures rather than functioning only as a technical demonstration.

The critical responses reinforce this interpretation. One participant stated that the NLI system was impressive but would not be sufficient to carry a game without wider story and gameplay content, while another did not yet consider unrestricted dialogue more beneficial than established dialogue options. Other participants discussed wanting a more developed world, clearer narrative goals, or additional ways for conversational interaction to influence gameplay. These responses suggest that participant interest depended partly on how effectively NLI could be integrated with broader game-design and narrative systems.

4. **Technical and Interaction Friction Disrupted Conversational Flow**

The positive reception of NLI was accompanied by recurring points of friction. Participants identified delays before NPC responses, dialogue that was overly long or repetitive, occasional technical and speech errors, and instances where NPC knowledge did not provide the information expected. Some participants also reported interface-related interruptions, including repeatedly activating the text-entry field or difficulty remembering information needed for tasks.

These issues were particularly relevant because they interrupted the conversational quality that participants otherwise valued. Delays or lengthy responses could reduce the immediacy of interaction, while repeated or limited answers could remind players of the technical boundaries of the system. The findings therefore indicate that engagement with NLI depends not only on the freedom offered by natural-language input, but also on the speed, clarity, responsiveness, and supporting interface through which that interaction occurs.

Taken together, RQ1 indicates that participants responded positively to the NLI-driven RPG and expressed consistent interest in experiencing and recommending similar designs. The qualitative findings suggest that this response was influenced by the freedom to communicate without predefined dialogue options, the responsiveness and personality of NPCs, and the integration of conversation with exploration, worldbuilding, puzzles, and narrative discovery. At the same time, technical delays, repetitive or lengthy responses, and interaction friction could weaken conversational flow. The findings therefore position NLI as a source of engagement when it supports wider game and narrative design, rather than as an isolated replacement for existing interaction systems.

6.3.3 Section 03 – Game Design

The first question of section 3 asked participants to identify what genre they felt best described the experimental game they had just played. The results are shown in Table 6.21:

Genre Identification	Entries
Role-Playing Game (RPG)	12
Adventure	7
Simulation	2
Strategy	1

(Table 6.21: Experimental Game Genre Identification)

Of the 22 participants, 12 at 54.55% identified the experimental game primarily as a RPG, while seven at 31.82% identified it as an adventure game. Two participants, at 9.09%, described it as a simulation and one, at 4.55%, as a strategy game.

The RPG response is particularly relevant to the context of the study, as the experimental game was developed to investigate the use of NLI within an RPG framework. However, the range of responses also indicates that participants did not perceive the prototype exclusively through a single genre classification. Adventure, simulation, and strategy elements were also recognised within the experience.

These results are therefore treated primarily as contextual evidence concerning how participants perceived the game rather than as a test of whether the prototype conforms to a particular genre definition. The responses establish that RPG was the most frequently selected classification within the sample while also reflecting the hybrid qualities of the experimental design.

The second question asked participants to rate the importance of NPCs in achieving a successful narrative experience within the experimental game. The responses are summarised in Table 6.22:

NPCs as a Successful Narrative Experience	Entries
Very Important	16
Somewhat Important	5
Hardly Important	1
Not Important At All	0

(Table 6.22: Importance of NPCs in Achieving a Successful Narrative Experience)

Of the 22 participants, 16 at 72.73% rated NPCs as very important and five at 22.73% as somewhat important. One participant, at 4.55%, considered NPCs to be hardly important, while none selected not important at all. Overall, 21 of the 22 participants therefore placed NPCs on the positive side of the scale.

These results indicate that NPCs were perceived as an important component of the narrative experience by most participants. This provides useful context for the subsequent questions concerning conversational realism, player influence, freedom, and the narrative role of NLI-driven characters.

The result should be interpreted as a measure of the perceived importance of NPCs within the experimental game rather than as evidence that NLI itself caused the positive narrative evaluation. The questionnaire item concerns NPC importance generally, while later questions provide more direct evidence about the contribution of NLI to those experiences.

Question 3 follows by asking participants whether improving the NPCs' access to information resulted in better narrative performance, with the results shown in Table 6.23:

NPC Narrative Performance	Entries
Much Better	12
Somewhat Better	8
Hardly Better	2
Not Better At All	0

(Table 6.23: Narrative Performance of NPCs with Improved Informational Access)

Of the 22 participants, 12 at 54.55% considered the NPCs to perform much better narratively when provided with improved access to information, while eight at 36.36% considered them somewhat better. Two participants, at 9.09% selected hardly better, while none selected not better at all. Overall, 20 of the 22 participants therefore responded towards the positive end of the scale.

These responses indicate that most participants perceived broader informational access as beneficial to the narrative performance of NPCs. This is relevant to the study because the ability of an NLI-driven character to draw upon information about its role, surrounding world, and narrative context affects the range of responses it can provide during interaction.

The result is treated as supporting descriptive evidence rather than as a direct measure of narrative agency or conversational realism. The question establishes participants' perceptions of informational access but does not independently demonstrate that increased access caused improvements in immersion, authenticity, or engagement.

Question 4 asked participants whether NPC interaction in the experimental game felt closer to real-life conversation with other humans than NPC interaction in other games. The responses are presented in Table 6.24:

NPC Comparison to Real Life	Entries
Somewhat Closer	11
Much Closer	6
Hardly Closer	4
Not Closer At All	1

(Table 6.24: Comparison of NPC Interaction to Real-Life Conversation)

Of the 22 participants, six at 27.27% considered the interactions much closer to real-life conversation and 11 at 50% somewhat closer. Four participants at 18.18% selected hardly closer, while one at 4.55% selected not closer at all. Overall, 17 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the 'Much Closer' and 'Somewhat Closer' responses were grouped as positive, while 'Hardly Closer' and 'Not Closer At All' formed the negative category. A two-sided exact binomial test showed that the observed 17 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p = .017$, with an exact 95% confidence interval of 54.6% to 92.2% for the positive response proportion.

The result indicates that responses within the sample were weighted towards perceiving the NLI-driven interactions as closer to real-life conversation than NPC interaction in other games. However, the distribution also shows variation in the strength of this perception, with the largest group selecting 'Somewhat Closer' rather than 'Much Closer'. The finding therefore supports a perceived movement towards more natural conversation without suggesting that the interactions were equivalent to human conversation.

Next, question 5 asked participants how much they felt the narrative was being driven by them, with the results shown in the following Table 6.25:

Narrative Driven by Players	Entries
Very Much	9
Somewhat	7
Hardly	5
Not Much At All	1

(Table 6.25: Perception of Player Influence on Narrative)

Of the 22 participants, nine at 40.91% responded ‘Very Much’ and seven at 31.82% ‘Somewhat’. Five participants at 22.73% selected ‘Hardly’, while one, at 4.55%, selected ‘Not Much At All’. Overall, 16 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Much’ and ‘Somewhat’ responses were grouped as positive, while ‘Hardly’ and ‘Not Much At All’ formed the negative category. A two-sided exact binomial test showed that the observed 16 positive responses from 22 participants did not differ significantly from an equal 50:50 response distribution at the $p < .05$ threshold, $p = .052$, with an exact 95% confidence interval of 49.8% to 89.3% for the positive response proportion.

The descriptive distribution nevertheless shows that most participants reported at least some sense of narrative influence, although the evidence is less consistent than for the preceding measure of conversational similarity to real-life interaction. The result therefore suggests that free-form NPC interaction may have supported a sense of involvement in the narrative for many participants, but this should not be treated as evidence that the wider narrative was consistently perceived as player-driven across the sample.

Figure 6.22 shows that question 6 invited participants to share how much they felt the NPC interaction encouraged player freedom, with the results presented in Table 6.26:

Player Freedom Encouraged by NPC Interaction	Entries
Very Much	12
Somewhat	6
Hardly	2

Not Much At All	2

(Table 6.26: Perception of Player Freedom Encouraged by NPC Interaction)

Of the 22 participants, 12 responded ‘Very Much’, at 54.55%, and six ‘Somewhat’, at 27.27%. Two participants, at 9.09%, selected ‘Hardly’, while two, also at 9.09%, selected ‘Not Much At All’. Overall, 18 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Much’ and ‘Somewhat’ responses were grouped as positive, while ‘Hardly’ and ‘Not Much At All’ formed the negative category. A two-sided exact binomial test showed that the observed 18 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p = .004$, with an exact 95% confidence interval of 59.7% to 94.8% for the positive response proportion.

The result indicates that responses within the sample were weighted towards perceiving NPC interaction as encouraging player freedom. This pattern is stronger than the result for Question 5 concerning whether participants felt they were driving the wider narrative. Taken together, the two questions suggest an important distinction between freedom within conversation and interaction, which was more consistently perceived, and influence over the broader narrative, which received a more mixed response.

Question 7 asked participants how much they felt the NPC interactions in Turing gave context to the game mechanics and overall game itself. The results are summarised in Table 6.27, as follows:

Context Driven by NPC Interaction	Entries
Very Much	17
Somewhat	5
Hardly	0
Not Much At All	0

(Table 6.27: Perception of Game & Mechanical Context Provided by NPC Interaction)

All 22 participants responded towards the positive end of the scale. Seventeen participants, at 77.27%, selected ‘Very Much’, while five, at 22.73%, selected ‘Somewhat’. No participants selected either ‘Hardly’ or ‘Not Much At All’.

These responses indicate that participants consistently perceived NPC interaction as contributing context to the mechanics and activities encountered during play. This is relevant to the role of NPCs within the experimental game because conversations were used not only for character interaction, but also to explain tasks, provide information about the world, and connect individual activities with their surrounding narrative context.

The finding should therefore be interpreted as evidence that participants recognised a contextual role for NPC interaction within the game. It does not, by itself, establish that NLI was solely responsible for their understanding of the mechanics or narrative, as other elements of the game design also contributed to communicating that information.

Figure 6.24 presents question 8, where participants were asked how well they felt the NPCs within the experimental game performed in delivering proper instructions. The results are shown in Table 6.28:

NPC Performance in Delivering Instructions	Entries
Very Well	19
Somewhat	2
Hardly	1
Not Well At All	0

(Table 6.28: Perception of Instructional Delivery by NPCs)

Of the 22 participants, 19 at 86.36% rated the NPCs as performing very well and two, at 9.09%, as somewhat well. One participant, at 4.55%, selected ‘Hardly’, while none selected ‘Not Well At All’. Overall, 21 of the 22 participants therefore responded towards the positive end of the scale.

These responses indicate that participants generally perceived the NPCs as effective sources of instructional information during play. This complements the findings from Question 7, where NPC interaction was also consistently perceived as providing context for the game and its mechanics.

The result is treated as supporting descriptive evidence rather than as proof that NLI is inherently more effective than traditional tutorial or interface systems. The question evaluates the performance of the NPCs within this particular implementation and

does not directly compare their instructional effectiveness with alternative approaches.

Question 9 asked participants how realistic they felt the NPCs were within Turing. The results are presented in Table 6.29, as follows:

Level of NPC Realism	Entries
Somewhat Realistic	14
Very Realistic	4
Hardly Realistic	3
Not Realistic At All	1

(Table 6.29: Observation of the Levels of Realism Within NPCs)

Of 22 participants, four rated the NPCs as very realistic at 18.18% and 14, at 63.64%, as somewhat realistic. Three participants, at 13.64%, selected ‘Hardly Realistic’, while one, at 4.55%, selected ‘Not Realistic At All’. Overall, 18 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Realistic’ and ‘Somewhat Realistic’ responses were grouped as positive, while ‘Hardly Realistic’ and ‘Not Realistic At All’ formed the negative category. A two-sided exact binomial test showed that the observed 18 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p = .004$, with an exact 95% confidence interval of 59.7% to 94.8% for the positive response proportion.

The result indicates that responses within the sample were weighted towards perceiving the NPCs as realistic. However, the distribution also shows that most positive responses fell within the ‘Somewhat Realistic’ category rather than ‘Very Realistic’. The finding therefore supports a generally positive perception of NPC realism while also indicating that this realism was qualified rather than absolute.

Question 10 asked how natural the participants felt that the NPCs within Turing were acting and perceiving their environment, with the results shown in Table 6.30:

How Natural NPCs Felt	Entries
Somewhat Natural	14
Hardly Natural	4
Very Natural	3

Not Natural At All	1

(Table 6.30: Perception of How Natural NPCs Acted and Perceived Their Environment)

Of the 22 participants, three at 13.64% rated the NPCs as very natural and 14 at 63.64% as somewhat natural. Four participants at 18.18% selected ‘Hardly Natural’, while one at 4.55% selected ‘Not Natural At All’. Overall, 17 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Natural’ and ‘Somewhat Natural’ responses were grouped as positive, while ‘Hardly Natural’ and ‘Not Natural At All’ formed the negative category. A two-sided exact binomial test showed that the observed 17 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p = .017$, with an exact 95% confidence interval of 54.6% to 92.2% for the positive response proportion.

The result indicates that responses within the sample were weighted towards perceiving the NPCs as acting and responding to their environment in a natural way. However, as with Question 9, most positive responses fell within the more moderate category, with 14 participants selecting ‘Somewhat Natural’ compared with three selecting ‘Very Natural’. The finding therefore supports a generally positive perception of NPC naturalness while also showing that participants did not consistently regard the behaviour and environmental awareness of the NPCs as fully natural.

Like at the end of section 2, question 11 provided participants with an opportunity to make any additional comments concerning the game-design section of the questionnaire. The responses were organised into descriptive categories to provide a question-level overview. These categories are distinct from the reflexive thematic analysis presented later in the RQ2 analytical synthesis. Positive observations are summarised in Table 6.31:

Positive Comments	Entries
Narrative helped with the immersion	3
Felt natural as robots	2
Felt more organic	2
Conversation becomes more realistic over time	1

Interactions were better than other games	1
NPCs reacted to player actions	1
Liked when NPCs had situational awareness	1

(Table 6.31: Positive Comments Related to the Game Design Section)

Eleven positive observations were identified. Participants referred to the relationship between narrative context and immersion, the suitability of the robotic characters to the conversational behaviour, and interactions that felt more organic than those experienced in other games. Additional comments highlighted NPCs responding to player actions and demonstrating awareness of nearby characters, objects, or changes in the game state.

These responses indicate that perceptions of realism and naturalness were influenced by more than conversational language alone. Participants also evaluated whether NPC behaviour appeared consistent with the narrative setting and whether characters demonstrated awareness of the situation surrounding them. The robotic framing was particularly relevant, with some participants explaining that behaviour they might not consider natural for a human character remained believable within the context of a robot character.

Participants also identified several limitations concerning NPC behaviour and interaction, summarised in Table 6.32:

Concerned Comments	Entries
Could do with more situational awareness	4
Too much delay for responses	2
More user feedback for NPCs	1
NPCs talk too much	1
NPCs were not inquisitive enough	1
Robots could not provide enough information	1
NPCs felt a little scripted	1

(Table 6.32: Comments of Concern Related to the Game Design Section)

Situational awareness was the most frequently identified concern, appearing in four observations. Participants described NPCs failing to acknowledge nearby characters, environmental circumstances, or changes following player actions. This contrasts with the positive comments in Table 6.31 where situational awareness was specifically valued when it occurred, suggesting that contextual responsiveness

contributed positively to believability when present but became noticeable when absent.

Other concerns included response delays, excessive dialogue length, limited inquisitiveness, insufficient access to information, and interactions that appeared scripted. These observations provide further context for the quantitative results concerning realism and naturalness. Participants did not assess NPC quality solely through linguistic fluency; they also considered whether characters responded appropriately to the player, the environment, and the developing state of the game.

Finally, other comments shared by participants in response to question 11 included observations that did not fit clearly within the positive or critical descriptive categories and are presented in Table 6.33:

Other Comments	Entries
Hard to quantify 'natural' and 'realistic' because NPCs are robots	2
Conversations did not feel like speaking to a human because participant was speaking to them like they are robots	2
Felt more like a metroidbrainia or puzzler	1
Would like to test the AI further	1
Couldn't break the NLI	1

(Table 6.33: Other Comments Related to the Game Design Section)

These comments further demonstrate the importance of narrative framing when interpreting realism and naturalness. Two participants explicitly stated that these concepts were difficult to assess because the characters were robots, while two noted that they did not approach the conversations as though they were speaking with humans. Other comments concerned genre perception, a desire to test the NLI system further, and attempts to identify the limits of its responses.

Taken together, the Question 11 responses suggest that participants evaluated NPC believability through a combination of conversational behaviour, narrative context, situational awareness, and technical responsiveness. Positive and critical observations frequently concerned the same underlying qualities, particularly contextual awareness and conversational naturalness, making these responses especially relevant to the thematic analysis of RQ2.

6.3.3.1 Research Question 2 Analytical Synthesis

Research Question 2: *How do NPC interactions driven by natural language systems influence player perceptions of narrative agency, realism, and freedom in role-playing games?*

As established in Section 4.6.1, relevant open-text responses were analysed using reflexive thematic analysis at a predominantly semantic level. For Research Question 2 (RQ2), responses were considered across the qualitative dataset where they addressed player freedom, narrative influence, NPC realism, naturalness, contextual awareness, or the relationship between conversational interaction and wider game events. This included relevant responses from Section 02 Questions 1, 2, 3, 8, and 10, together with the additional comments provided in Section 03 Question 11. Responses were able to contribute to more than one research question where appropriate.

Initial semantic codes were compared across these responses and grouped into broader patterns of meaning before being reviewed and refined into four themes relevant to RQ2. The descriptive categories presented earlier in Sections 6.3.2 and 6.3.3 remain question-level summaries and are therefore distinct from this cross-question thematic analysis. The full participant-level semantic coding for RQ2 is provided in Appendix 5B, while Table 6.34 summarises the principal codes contributing to each theme.

Theme	Illustrative Semantic Codes
Free-Form Dialogue Increased Expressive Freedom, but Agency Depended on Consequence	Freedom to ask self-selected questions; greater control over conversation; communication without predefined dialogue; experimentation with NPC responses; player-authored questions; limits to manipulating NPCs; limited wider narrative consequence
Believability Was Shaped by Narrative Context Rather Than Human Imitation	Robots felt natural within the setting; behaviour matched expectations of robotic characters; difficulty judging human realism; narrative framing supported believability; players approached NPCs as robots rather than humans
Contextual Responsiveness and	NPCs reacted to player actions; acknowledgement of collected items; awareness of nearby characters and

Situational Awareness Strengthened NPC Realism	objects; access to game information; contextual responses; lack of situational awareness weakened interaction
Technical and Scripted Limitations Disrupted Natural Interaction	Response delays; overly long dialogue; repetitive responses; scripted conversational openings; limited inquisitiveness; insufficient contextual knowledge; unnatural turn-taking; speech and technical errors

(Table 6.34: RQ2 Themes and Illustrative Semantic Codes)

The quantitative findings provide an initial distinction between perceptions of conversational freedom, narrative agency, and NPC realism. Seventeen of the 22 participants considered the NPC interactions closer to real-life conversation than those encountered in other games, a distribution that differed significantly from an equal positive and negative response split, $p = .017$. Eighteen participants reported that NPC interaction encouraged player freedom, $p = .004$, while 18 also rated the NPCs towards the positive end of the realism scale, $p = .004$. Seventeen participants rated the NPCs positively in relation to acting and perceiving their environment naturally, $p = .017$.

The result concerning wider narrative agency was less conclusive. Sixteen of the 22 participants felt that the narrative was being driven by them to at least some extent, but this distribution did not differ significantly from an equal response split at the $p < .05$ threshold, $p = .052$. Supporting descriptive measures nevertheless showed that 20 participants considered improved NPC access to information beneficial to narrative performance, all 22 felt NPC interaction provided context for the game and its mechanics, and 21 rated NPC instructional performance positively.

The reflexive thematic analysis of the open-text responses produced the following four themes relevant to RQ2:

1. **Free-Form Dialogue Increased Expressive Freedom, but Agency Depended on Consequence**

Participants frequently associated NLI with an increased ability to express themselves and determine how conversations developed. Responses described being able to ask personally relevant questions, communicate creatively, test NPC boundaries, and pursue information without relying on predefined dialogue options. This conversational freedom was also associated with exploration, as players could

decide which questions to ask when investigating characters, quests, or the wider game world.

However, the qualitative responses also indicate that freedom of expression was not always equivalent to wider narrative agency. Some participants encountered limits when attempting to manipulate NPCs, obtain more complex information, or influence events beyond the immediate conversation. Others expressed interest in seeing conversational choices produce clearer consequences within the wider narrative or game state.

This distinction is reflected in the quantitative findings. NPC interaction was significantly weighted towards encouraging player freedom, with 18 of 22 positive responses, whereas the measure of whether players felt they were driving the wider narrative produced a more mixed 16-to-six split that narrowly fell outside the $p < .05$ threshold. The combined evidence therefore suggests that NLI increased expressive and conversational freedom more consistently than it produced a sense of control over the wider narrative.

2. **Believability Was Shaped by Narrative Context Rather Than Human Imitation**

Participant responses indicate that NPC realism was evaluated in relation to the narrative context in which the characters existed rather than solely according to how closely they replicated human conversation. Several participants explicitly found the concepts of ‘realistic’ and ‘natural’ difficult to assess because the NPCs were presented as robots. Some explained that behaviours which might appear unnatural for a human character remained believable because they were consistent with expectations of robotic characters within the abandoned colony setting.

This also affected how participants approached the conversations. Some stated that the interactions did not feel like speaking with humans because they themselves were not addressing the characters as though they were human. Other responses suggested that the robot setting helped contextualise unusual conversational behaviour and made particular quirks feel more appropriate within the fiction.

The positive quantitative ratings of realism and naturalness should therefore not be interpreted simply as evidence that the NPCs successfully imitated human conversation. Instead, the qualitative findings suggest that believability emerged

partly from consistency between NPC behaviour and the narrative role assigned to those characters. Within Turing, contextual credibility appears to have been at least as important as direct human imitation.

3. **Contextual Responsiveness and Situational Awareness Strengthened NPC Realism**

Participants repeatedly evaluated NPCs according to their awareness of the surrounding game state. Positive comments highlighted characters recognising collected keycards, acknowledging nearby robots or objects, and responding appropriately to changes in gameplay. These moments contributed to perceptions that the characters were responsive to the situation rather than simply producing isolated conversational responses.

The reverse pattern was also apparent. Participants noticed when NPCs appeared unaware of nearby characters, failed to acknowledge changes following completed tasks, or lacked information that seemed relevant to their role or environment. Situational awareness therefore appeared to operate in both directions: its presence strengthened believability, while its absence exposed the boundaries of the conversational system.

This interpretation is supported by the descriptive quantitative findings. Twenty of the 22 participants considered improved access to information beneficial to NPC narrative performance, while all 22 reported that NPC interaction provided context for the game and its mechanics. These findings suggest that NPC realism was influenced not only by linguistic fluency, but by whether characters appeared aware of the wider narrative and gameplay circumstances in which conversation occurred.

4. **Technical and Scripted Limitations Disrupted Natural Interaction**

The perception of natural interaction was reduced when technical or design limitations became visible. Participants identified delays before NPC responses, dialogue that was overly long or repetitive, speech errors, limited contextual knowledge, and conversational behaviour that sometimes appeared scripted. In particular, some participants described NPCs beginning conversations with predetermined information regardless of the player's initial input, while others found that characters asked questions without allowing an appropriate opportunity to respond.

Similar observations appeared within Section 03, where participants identified response delay as a barrier to natural communication, described some NPCs as insufficiently inquisitive, and commented that limited situational awareness could make interactions appear pre-scripted. One participant specifically observed that an NPC could initially follow its own conversational direction regardless of player input before becoming more responsive later in the exchange.

These comments help explain why the quantitative ratings of realism and naturalness were generally positive but concentrated within the more moderate response categories. Fourteen participants selected ‘Somewhat Realistic’ and 14 selected ‘Somewhat Natural’, compared with four and three respectively selecting the strongest positive option. The findings suggest that NLI could support believable interaction, but that visible technical or scripted boundaries could weaken that perception when conversational responsiveness broke down.

Taken together, the findings for RQ2 indicate that NLI-driven NPC interaction supported perceptions of player freedom and NPC realism, but these effects were not uniform across every aspect of narrative experience. Participants more consistently perceived freedom in how they could communicate than control over the wider narrative, suggesting that expressive agency within dialogue does not automatically produce narrative agency unless conversational choices are connected to meaningful consequences elsewhere in the game.

NPC realism was similarly shaped by more than linguistic naturalness. Narrative framing, access to contextual information, awareness of the surrounding environment, and responsiveness to changes in game state all contributed to whether characters were perceived as believable. Conversely, response delays, repetitive or scripted behaviour, limited information, and weak situational awareness exposed the boundaries of the system and disrupted otherwise natural interaction. RQ2 therefore suggests that the narrative value of NLI-driven NPCs depends on how conversational freedom is connected to consequence, context, and wider game-state responsiveness.

6.3.4 Section 04 – Natural Language Interaction

Question 1 of section 4 started by asking participants if they had previously used a virtual assistant before, such as Alexa, Siri, Google, or a similar system. The results are shown in Table 6.35, as follows:

Virtual Assistants Use	Entries
Yes	21
No	1

(Table 6.35: Participant Experience with Virtual Assistants)

Of the 22 participants, 21 at 95.45% reported prior experience with a virtual assistant, while one participant at 4.55% reported no previous experience. This establishes that almost the entire sample had some familiarity with conversational AI systems before engaging with the experimental game.

This result provides contextual information for interpreting the subsequent NLI questions. However, prior familiarity with virtual assistants should not be treated as evidence that participants systematically compared Turing with those systems. Direct comparisons are only established where participants explicitly made them in later open-text responses.

Figure 6.29 presents question 2, where participants were asked if they had previously played a game that allowed interaction using their own written or spoken input, with the results shown in Table 6.36:

Written/Spoken Voice Interaction	Entries
Yes	11
No	11

(Table 6.36: Participant Experience with Games Using Written or Spoken Voice Interaction)

The participant group was evenly divided at 50%, with 11 participants reporting previous experience with this form of interaction and 11 reporting no prior experience.

This result provides useful context for the comparisons made in Question 3. Participants who reported prior experience were able to identify specific games or systems for comparison, while those without such experience did not contribute a direct comparison. The result should therefore be treated as a measure of prior exposure rather than as evidence of a deliberately balanced participant sample.

Question 3 asked participants who had reported prior experience in Question 2 to identify the game or system they had used and explain how it compared with the experimental game. The responses were cleaned and summarised descriptively in

Table 6.37. As participants could mention more than one previous implementation, the table represents comparison entries rather than a one-to-one count of participants:

Game	Comparison to Experimental Game
Untold Stories	Like an old BBC adventure game, required specific keywords to trigger responses. Not as free and natural as this game.
FIFA (Unspecified Version)	Allowed voice commands for substitutions and tactical changes.
Phasmophobia	Voice tech is basic; differs as this game allowed asking robots to expand or explain.
Lethal Company	Only uses voice proximity; adds little compared to the experimental game.
Skyrim (Voice Mod)	More fleshed out than Skyrim mod, which didn't work well. Experimental game performed better.
Facade	Experimental game was much better.
Skyrim / Mass Effect (Kinect)	Experimental game was better at understanding inputs compared to games with Kinect voice functionality.
Cryptmaster	Cryptmaster uses single-word inputs effectively, but this game allows a broader range of input and complexity.
Phasmophobia	Experimental game is more complex; Phasmophobia's interaction is simplified.
Tom Clancy's End War	Used prescribed spoken words for commands; experimental game is much more immersive and offers broader interaction.
Old Adventure Games (80s)	Experimental game is much more sophisticated with generative AI.
Siri (Not a Game)	Project's NPCs performed better than Siri, offering more functionality and interaction.

(Table 6.37: Comparison of Games against Turing)

The comparisons covered a range of earlier interaction approaches, including keyword-driven text input, prescribed voice commands, voice recognition, proximity-based voice systems, and more recent natural-language implementations. Participants frequently distinguished Turing from these examples in terms of the range and flexibility of input available to the player. For example, previous systems were described as requiring specific keywords, single-word inputs, or prescribed

spoken commands, while the experimental game was described as allowing broader questioning, explanation, and conversational interaction.

Several participants also described the experimental game as more natural, complex, sophisticated, or effective at understanding their input than the systems they had previously encountered. These comparisons included games such as *Untold Stories*, *Phasmophobia*, *Façade*, *Cryptmaster*, *Tom Clancy's EndWar*, and voice-enabled interactions in *Skyrim* and *Mass Effect*. The responses therefore suggest that participants who had relevant prior experience often perceived the experimental game as providing a broader form of interaction than the more constrained systems they recalled.

One participant also compared the experimental game with Siri, despite Question 3 asking specifically about games. This response provides a direct comparison with a virtual assistant, but it should be distinguished from the wider finding that 21 participants had previously used virtual assistants. Familiarity with virtual assistants does not by itself demonstrate that participants systematically compared Turing with those systems during evaluation.

Next, question 4 inquired how successful the participants felt this form of interaction translated into a video game environment, with results shown in Table 6.38:

Perceived Success of Interaction Style	Entries
Very Successful	15
Somewhat Successful	7
Hardly Successful	0
Not Successful At All	0

(Table 6.38: Success of Interaction Style in Video Game Environment)

All 22 participants responded towards the positive end of the scale, with 15, at 68.18%, rating the interaction as very successful and seven, at 31.82%, as somewhat successful. No participants selected either 'Hardly Successful' or 'Not Successful At All'.

For inferential analysis, the 'Very Successful' and 'Somewhat Successful' responses were grouped as positive, while 'Hardly Successful' and 'Not Successful At All' formed the negative category. A two-sided exact binomial test showed that the observed 22 positive responses from 22 participants differed significantly from an

equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0% for the positive response proportion.

The result indicates that participants consistently perceived the interaction approach as translating successfully into the video game environment. However, this question evaluates the suitability and perceived effectiveness of the interaction style within the experimental game; it does not by itself establish that NLI improved immersion, engagement, or narrative quality relative to alternative interaction systems.

Question 5 invited the participants to express how realistic they felt the NPC interactions were within the experimental game, with the results summarised in Table 6.39:

Realistic Assessment of NPC Interactions	Entries
Somewhat Realistic	16
Very Realistic	4
Hardly Realistic	1
Not Realistic At All	1

(Table 6.39: Perceived Realistic Value of NPC Interactions)

Of the 22 participants, four at 18.18% rated the NPC interactions as very realistic and 16 at 72.73% as somewhat realistic. One participant, at 4.55%, selected ‘Hardly Realistic’, while one, at 4.55%, selected ‘Not Realistic At All’. Overall, 20 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Realistic’ and ‘Somewhat Realistic’ responses were grouped as positive, while ‘Hardly Realistic’ and ‘Not Realistic At All’ formed the negative category. A two-sided exact binomial test showed that the observed 20 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 70.8% to 98.9% for the positive response proportion.

The result indicates that responses within the sample were strongly weighted towards perceiving the NPC interactions as realistic. However, the distribution was concentrated primarily within the ‘Somewhat Realistic’ category rather than ‘Very Realistic’, suggesting that participants generally perceived a degree of realism without consistently regarding the interaction as fully realistic.

Figure 6.33 relates to question 6, which asked participants how accurately they felt the NPCs understood them within the experimental game. The results are shown in Table 6.40, as follows:

Perceived NPC Understanding	Entries
Very Accurate	13
Somewhat Accurate	8
Hardly Accurate	1
Not Accurate At All	0

(Table 6.40: Perceived Accuracy of NPC Understanding)

Of the 22 participants, 13 at 59.09% rated NPC understanding as very accurate and eight, at 36.36%, as somewhat accurate. One participant at 4.55% selected ‘Hardly Accurate’, while none selected ‘Not Accurate At All’. Overall, 21 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Accurate’ and ‘Somewhat Accurate’ responses were grouped as positive, while ‘Hardly Accurate’ and ‘Not Accurate At All’ formed the negative category. A two-sided exact binomial test showed that the observed 21 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 77.2% to 99.9% for the positive response proportion.

The result indicates that participants consistently perceived the NPCs as accurately understanding their input. This provides direct evidence concerning the perceived effectiveness of the NLI system, particularly its ability to interpret player-authored written or spoken language within the game environment.

Question 7 asked participants how engaging they found the NPCs within the experimental game, with the results presented in Table 6.41:

Perceived NPC Engagement	Entries
Very Engaging	11
Somewhat Engaging	9
Hardly Engaging	2
Not Engaging At All	0

(Table 6.41: Perceived Engagement with NPCs)

Of the 22 participants, 11 at 50% rated the NPCs as very engaging and nine at 40.91% as somewhat engaging. Two participants, at 9.09% selected ‘Hardly Engaging’, while none selected ‘Not Engaging At All’. Overall, 20 of the 22 participants therefore responded towards the positive end of the scale.

These responses indicate that most participants found the NPCs engaging during the experimental game. The result provides supporting context for the preceding measures of interaction success, realism, and perceived understanding, but should not be interpreted independently as evidence that NLI itself caused engagement.

As engagement can also be influenced by characterisation, narrative context, task design, worldbuilding, and other aspects of the game, this measure is retained as descriptive supporting evidence rather than subjected to additional inferential testing.

Question 8 provided participants with a final opportunity to make additional comments concerning the NLI section of the questionnaire. The responses were organised into descriptive categories to provide a question-level overview. These categories are distinct from the reflexive thematic analysis presented later in the RQ3 analytical synthesis, and positive observations are first summarised in Table 6.42 as follows:

Positive Comments	Entries
NPCs were engaging	2
Would like to play more	2
Wanted to explore more	2
NPCs were good at understanding	1
Very impressed	1

(Table 6.42: Positive Comments Related to NLI Section)

The positive observations concerned NPC engagement, perceived understanding, and participants’ interest in continuing to explore the experimental game. Two participants described the NPCs as engaging, while others expressed a desire either to continue playing or to spend more time exploring the conversational possibilities. One participant also commented positively on the NPCs’ ability to understand and respond to corrections after an initial misunderstanding.

These responses provide additional context for the structured results reported in Questions 4–7, particularly the positive evaluations of interaction success, NPC

understanding, and engagement. They also indicate that part of the appeal of the system involved curiosity about how far the conversational interaction could be explored rather than only the completion of predefined game tasks.

Participants also identified several limitations concerning NPC understanding, knowledge, and conversational behaviour. These observations are summarised in Table 6.43:

Concerned Comments	Entries
NPCs sometimes misunderstood	2
NPCs needed more access to information	2
NPCs talk too much	1
NPCs felt scripted	1

(Table 6.43: Concerned Comments Related to NLI Section)

The concerns included occasional misunderstandings of player input, limited access to information about the game world or individual tasks, lengthy dialogue, and interactions that appeared scripted. Although the structured measure of NPC understanding was strongly positive overall, these comments show that successful comprehension was not consistent in every interaction. In some cases, participants were able to correct misunderstandings, while in others the limitation concerned what the NPC knew rather than whether it had understood the wording of the input.

This distinction is important for evaluating NLI effectiveness. Accurate interpretation of a player's language does not necessarily mean that an NPC possesses sufficient contextual knowledge to provide a useful response. Participants also identified dialogue length and choreographed or scripted phrasing as factors that could reduce the natural quality of an otherwise flexible conversational system.

Several additional observations did not fit clearly within the preceding positive or critical categories and are presented in Table 6.44:

Other Comments	Entries
Foresee improvement with more development time	1
Interested in exploring boundaries of NPC conversations	1
Participant offered more mechanics	1

(Table 6.44: Other Comments Related to NLI Section)

These comments included an expectation that the system could improve through further development, interest in exploring the limits of NPC conversation, and a suggestion for conversational interrogation as a game mechanic. The responses demonstrate that participants were not only evaluating whether the NLI system functioned, but also considering how its conversational capabilities might be incorporated into additional forms of gameplay.

Taken together, the Question 8 responses provide further context for the evaluation of NLI effectiveness. Participants identified strong understanding, engagement, and conversational flexibility alongside limitations involving occasional misunderstanding, restricted knowledge, dialogue length, and scripted behaviour. These observations are considered alongside the direct comparisons in Question 3 and the structured results from Questions 4–7 within the RQ3 thematic analysis.

6.3.4.1 Research Question 3 Analytical Synthesis

Research Question 3: *How do players evaluate the effectiveness and realism of NLI systems in video game environments, particularly in comparison to virtual assistants and other NLI-integrated games?*

As established in Section 4.6.1, relevant open-text responses were analysed using reflexive thematic analysis at a predominantly semantic level. For RQ3, the analysis focused primarily on the direct comparisons provided in Section 04 Question 3 and the additional observations provided in Question 8. These responses were considered alongside the structured measures of interaction success, realism, understanding, and engagement presented earlier in Section 6.3.4.

Initial semantic codes were compared across the responses and grouped into broader patterns of meaning before being reviewed and refined into four themes relevant to RQ3. The descriptive categories presented earlier in Section 6.3.4 remain question-level summaries and should therefore be distinguished from this cross-question thematic analysis. The full participant-level semantic coding for the qualitative material relevant to RQ3 is provided in Appendix 5C, while Table 6.45 summarises the principal codes contributing to each theme.

Theme	Illustrative Semantic Codes
Turing Was Perceived as More Flexible Than	Previous systems required keywords; prescribed voice commands; single-word inputs; broader range of input in

Earlier NLI Implementations	Turing; ability to ask for explanation; greater conversational freedom; improved understanding of varied input
Effective Understanding Supported Positive Evaluation Despite Occasional Errors	NPCs understood player input accurately; successful response to corrections; occasional misunderstanding of names or phrases; minor input errors; strong perceived comprehension despite isolated failures
Conversational Realism Depended on Depth, Naturalness and Contextual Knowledge	Interactions felt realistic; dialogue could feel scripted or choreographed; lengthy responses reduced naturalness; NPCs needed greater world knowledge; conversational depth affected realism; contextual information strengthened responses
NLI Effectiveness Was Judged Through the Possibilities It Enabled	Interest in exploring conversational boundaries; desire for longer conversations or small talk; interrogation as gameplay; potential for further mechanics; curiosity about future development; conversational systems enabling new forms of interaction

(Table 6.45: RQ3 Themes and Illustrative Semantic Codes)

The quantitative findings indicate a consistently positive evaluation of NLI effectiveness within the experimental game. All 22 participants rated the translation of the interaction approach into the video game environment as either very or somewhat successful. This distribution differed significantly from an equal positive and negative response split, $p < .001$. Twenty participants rated the NPC interactions as realistic, $p < .001$, while 21 participants reported that the NPCs understood them accurately, also $p < .001$. Supporting descriptive evidence showed that 20 of the 22 participants found the NPCs engaging.

Prior-experience measures provide additional context for these results. Twenty-one participants had previously used a virtual assistant, while 11 had previously played a game that allowed written or spoken interaction. However, familiarity with virtual assistants should not be treated as equivalent to direct comparison. The open-text responses provide substantially more direct comparison with previous games and game-related systems, while only one participant explicitly compared Turing with Siri.

The reflexive thematic analysis of the open-text responses produced the following four themes relevant to RQ3:

1. **Turing Was Perceived as More Flexible Than Earlier NLI Implementations**

Participants who had previous experience with comparable games frequently distinguished Turing from earlier systems through the breadth of language that could be used. Previous implementations were described as relying on specific keywords, prescribed spoken commands, single-word inputs, or relatively simple language recognition. Examples included *Untold Stories*, *Phasmophobia*, *Tom Clancy's EndWar*, Kinect-enabled games, and voice-based interaction within *Skyrim*.

By contrast, participants described Turing as allowing them to ask NPCs to expand on or explain information, use a wider range of phrasing, and engage in more developed conversational exchanges. Some explicitly described the experimental game as more natural, complex, sophisticated, or effective at understanding what they said than systems they had previously encountered. One participant also compared the NPCs favourably with their previous experience of Siri.

These comparisons suggest that perceived effectiveness was influenced partly by the reduction of restrictions on player input. Rather than evaluating NLI only according to whether a command was successfully recognised, participants also considered how freely they could formulate input and whether the system could continue an interaction beyond a predefined command structure.

2. **Effective Understanding Supported Positive Evaluation Despite Occasional Errors**

Perceived understanding was one of the strongest aspects of the quantitative evaluation, with 21 of the 22 participants rating NPC comprehension positively. The open-text responses generally support this finding. Participants referred positively to the ability of NPCs to interpret varied input, while one participant specifically noted that an NPC responded appropriately after initially misunderstanding and then being corrected.

However, the qualitative responses also demonstrate that understanding was not error-free. Participants reported occasional misunderstandings of names or other input, as well as minor speech or text-to-speech errors. These comments are

important because they qualify the otherwise strongly positive structured result: participants could perceive the system as effective overall while still encountering individual failures.

Effectiveness therefore appears to have depended less on perfect comprehension than on whether the system usually understood the player sufficiently well for conversation to continue. The ability to recover from or correct occasional misunderstanding also contributed to this perception.

3. **Conversational Realism Depended on Depth, Naturalness and Contextual Knowledge**

Although 20 participants rated NPC interaction towards the realistic end of the scale, most selected ‘Somewhat Realistic’ rather than ‘Very Realistic’. The qualitative responses provide further explanation for this more moderate evaluation. Participants identified lengthy dialogue, phrasing that could feel scripted or choreographed, and insufficient conversational depth as factors that weakened the natural quality of interaction.

NPC knowledge also affected evaluations of realism. Participants noted situations where characters understood the player’s wording but lacked sufficient information about their task, the game world, or surrounding narrative context to provide a useful answer. This distinction demonstrates that language comprehension and conversational effectiveness were not perceived as the same quality. An NPC could understand a question accurately while still producing an unsatisfactory response because its available knowledge was limited.

The findings therefore suggest that conversational realism depended on a combination of linguistic understanding, response quality, conversational depth, and appropriate contextual knowledge. Accurate natural-language processing alone was not sufficient to produce consistently realistic interaction.

4. **NLI Effectiveness Was Judged Through the Possibilities It Enabled**

Participant evaluation was not limited to whether the implemented system functioned successfully. Several responses considered what the interaction approach might enable if developed further. Participants expressed interest in exploring the boundaries of NPC conversations, engaging characters in longer or less task-

focused exchanges, and testing how far the system could respond outside predetermined gameplay requirements.

Other comments considered how NLI might become part of game mechanics themselves. One participant proposed interrogating an NPC by constructing appropriate questions to uncover clues, while others were interested in how conversational systems might develop with additional time and content. These observations suggest that participants judged NLI partly through the design opportunities created by allowing players to communicate more freely with characters.

This theme complements the direct comparisons with earlier implementations. The perceived advantage of Turing was not simply that it recognised a greater number of phrases, but that broader language input appeared capable of supporting interactions that more constrained command-based systems could not easily provide.

Taken together, the findings for RQ3 indicate that participants evaluated the NLI implementation positively in terms of its effectiveness within a video game environment, perceived understanding, and conversational realism. Participants with relevant previous experience commonly described Turing as offering broader and more flexible interaction than systems based on keywords, prescribed commands, or limited forms of voice recognition.

However, effective understanding did not automatically produce fully realistic conversation. Participant responses demonstrate that realism also depended on conversational depth, natural phrasing, response length, and the extent of an NPC's contextual knowledge. Occasional misunderstanding was generally compatible with an overall positive evaluation, whereas limitations in what an NPC knew or how naturally it sustained conversation could make the boundaries of the system more apparent.

RQ3 therefore suggests that the effectiveness of NLI in games is perceived not only through accurate recognition of player input, but through the range and quality of interaction that recognition enables. Within this study, participants generally regarded the experimental system as more flexible than earlier implementations they had encountered, while also identifying contextual knowledge and conversational

depth as important factors in determining whether that flexibility translated into believable NPC interaction.

6.3.5 Section 05 – Human-Computer Interaction

For the final section, question 1 began with asking participants to share which peripherals they used when playing the experimental game, and the results are shown in Table 6.46, as follows:

Peripherals Used	Entries
Keyboard	22
Mouse	22
Monitor	22
Headphones with built-in microphone	14
Headphones without built-in microphone	6
Touchscreen	0
Gamepad	0
Microphone	0
Virtual reality headset with built-in microphone	0
Virtual reality headset without built-in microphone	0
Virtual reality headset with built-in speakers	0
Virtual reality headset without built-in speakers	0

(Table 6.46: Peripherals Used During Gameplay)

All 22 participants used a keyboard, mouse, and monitor during the experimental session. Fourteen participants, at 63.64%, also reported using headphones with a built-in microphone, while six, at 27.27%, used headphones without a built-in microphone. No participants reported using a standalone microphone, touchscreen, gamepad, or virtual reality headset.

These results provide contextual information concerning the hardware used during the study. Keyboard and mouse input were available to all participants, while a built-in microphone provided the option of spoken input for those participants using compatible headphones. Peripheral use should not, however, be treated as evidence of which natural-language input method each participant chose during individual interactions.

Question 2 asked participants how immersive they found using their own written or spoken input while interacting with the experimental game. The results are summarised in Table 6.47:

Perceived Immersion Using Voice	Entries
Very Immersive	14
Somewhat Immersive	6
Hardly Immersive	2
Not Immersive At All	0

(Table 6.47: Perceived Immersion Using Written or Spoken Voice)

Of the 22 participants, 14 at 63.64% rated the interaction as very immersive and six at 27.27% as somewhat immersive. Two participants at 9.09% selected ‘Hardly Immersive’, while none selected ‘Not Immersive At All’. Overall, 20 of the 22 participants therefore responded towards the positive end of the scale.

For inferential analysis, the ‘Very Immersive’ and ‘Somewhat Immersive’ responses were grouped as positive, while ‘Hardly Immersive’ and ‘Not Immersive At All’ formed the negative category. A two-sided exact binomial test showed that the observed 20 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 70.8% to 98.9% for the positive response proportion.

The result indicates that responses within the sample were strongly weighted towards perceiving written or spoken natural-language input as immersive. The distribution was also concentrated towards the strongest positive response, with 14 participants selecting ‘Very Immersive’. However, the question evaluates participants’ overall experience of natural-language input and does not distinguish the relative contribution of written input from spoken input.

Next, question 3 asked how intuitive it felt for participants to use their written or spoken input during gameplay, and the results are presented in the following Table 6.48:

Perceived Intuitiveness of Using Voice	Entries
Somewhat Intuitive	12
Very Intuitive	10
Hardly Intuitive	0

Not Intuitive At All	0

(Table 6.48: Perceived Intuitiveness of Using Written or Spoken Voice)

All 22 participants responded towards the positive end of the scale. Ten participants at 45.45% rated the interaction as very intuitive, while 12 at 54.55% rated it as somewhat intuitive. No participants selected either ‘Hardly Intuitive’ or ‘Not Intuitive At All’.

For inferential analysis, the ‘Very Intuitive’ and ‘Somewhat Intuitive’ responses were grouped as positive, while ‘Hardly Intuitive’ and ‘Not Intuitive At All’ formed the negative category. A two-sided exact binomial test showed that the observed 22 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0% for the positive response proportion.

The result indicates that participants consistently perceived written or spoken natural-language input as intuitive within the experimental game. However, the distribution was weighted slightly more towards ‘Somewhat Intuitive’ than ‘Very Intuitive’, suggesting that while no participants evaluated the interaction negatively, the strength of that positive evaluation varied across the sample.

Compared to traditional menu-driven models and dialogue tree options, question 4 asked participants whether the interaction approach in the experimental game felt like a progression or regression in terms of video game interaction. The outcome is shown in Table 6.49:

Perception of Interaction	Entries
Progression	20
Regression	2

(Table 6.49: Perceived Direction of Interaction Approaches)

Twenty of the 22 participants, at 90.91%, described the approach as a progression, while two participants, at 9.09% described it as a regression.

A two-sided exact binomial test showed that the observed 20 progression responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 70.8% to 98.9% for the proportion selecting progression.

The result indicates that responses within the sample were strongly weighted towards viewing the interaction approach as a progression relative to menu-driven and dialogue-tree interaction. However, the question captures participants' overall comparative judgement rather than identifying which specific characteristics of the system produced that judgement. Those reasons are examined through the open-text responses to Question 5.

Question 5 asked participants to explain why they had characterised the experimental game's interaction approach as either a progression or regression in Question 4. The open-text responses were organised into descriptive categories to provide a question-level overview, as shown in Table 6.50. As individual responses could contribute to more than one category, the number of category entries exceeds the number of participants, and these descriptive categories are distinct from the reflexive thematic analysis presented later in the RQ4 analytical synthesis.

Feedback Categories	Entries
Freedom and Player Agency	7
Dynamic and Immersive Interaction	6
Natural and Realistic Engagement	5
Tailoring to Individual Play Styles	4
Immersion Through Real-Time Responses	3
Potential for Refinement	3
Broader Implications and Potential	2

(Table 6.50: Descriptive Categories of Feedback on Interaction Approaches)

A recurring observation concerned the freedom to determine the wording, tone, and intent of an interaction rather than selecting from predefined dialogue options. Participants described being able to ask what they wanted, phrase questions in their own way, and represent their intended personality or approach more directly. Several contrasted this with dialogue trees in which the available options could restrict expression or produce dialogue that did not match what the player expected their character to say.

Participants also described the interaction as dynamic, fluid, personal, and natural. Some connected this flexibility with immersion, particularly where they were able to respond using language of their own choosing rather than selecting from a list of predetermined options. Others compared the interaction with speaking to another

person or suggested that natural-language input allowed conversations to change according to the immediate interests of the player.

However, the responses also qualify the strongly positive result from Question 4. One participant described the approach as a different experience rather than clearly a progression or regression, while another noted that the approach may suit some players better than others and should not necessarily replace conventional interaction in every game. A further participant found it more difficult to obtain desired information because the removal of predefined choices also removed some of the guidance concerning what individual NPCs knew.

Question 5 therefore provides additional context for the progression responses reported in Question 4. Participants frequently valued greater expressive freedom and more flexible conversation, but the open-text responses also identify a trade-off between that freedom and the guidance provided by conventional dialogue systems. These observations are examined further within the RQ4 thematic analysis.

Question 6 then asked participants if they believed the approaches used in the experimental game will improve over time to become even more viable. The responses are shown in Table 6.51, as follows:

Perception of Viability Over Time	Entries
Yes	22
No	0

(Table 6.51: Perceived Future Viability of Interaction Approaches)

All 22 participants, at 100%, selected ‘Yes’, indicating a unanimous expectation within the sample that the approaches demonstrated by the experimental game could become more viable through further development.

This result provides descriptive evidence of participant expectations concerning the future development of NLI. However, it reflects participants’ perceptions rather than demonstrating that such systems will necessarily improve, become more widely adopted, or achieve greater viability over time.

In question 7, participants were asked whether they believed the style of technology implementation used for the experimental game opens up new design possibilities for games. The answers are presented in Table 6.52:

Perception of New Design Possibilities	Entries
Yes	22
No	0

(Table 6.52: Potential for New Game Design Possibilities)

Again, all 22 participants at 100% selected ‘Yes’, indicating unanimous agreement within the sample that the approach could support new possibilities for game design.

A two-sided exact binomial test showed that the observed 22 positive responses from 22 participants differed significantly from an equal 50:50 response distribution, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0% for the proportion selecting ‘Yes’.

The result indicates that participants consistently perceived the NLI implementation as capable of enabling forms of game design beyond those demonstrated directly within the experimental game. However, the measure reflects participant perceptions of design possibility rather than establishing that particular future applications will necessarily be successful or appropriate.

Finally, like in previous sections, question 8 provided participants with a final opportunity to make additional comments at the conclusion of the questionnaire. The responses were organised into descriptive categories to provide a question-level overview. As individual responses could contribute to more than one category, the number of category entries does not represent a unique participant total. These categories are distinct from the reflexive thematic analysis presented later in the RQ4 analytical synthesis. Table 6.53 presents a summary of the positive and future-facing comments:

Positive or Future-Facing Observation	Entries
Potential Applications in Other Game Contexts	3
Future Adoption of NLI Interaction	2
Reduction of Interaction Overheads	1
More Human-Feeling NPC Interaction	1

(Table 6.53: Positive and Future-Facing Comments Related to HCI)

Several responses considered possible applications of NLI beyond the interaction demonstrated directly within the experimental game. Participants suggested uses

including communication with a racing-game pit crew, issuing instructions to squad members in tactical games, and application across different game genres. Other participants anticipated greater future adoption of this form of interaction or suggested that similar NPC systems could improve existing games.

One participant also identified the possibility of reducing interaction overhead by allowing players to receive guidance without navigating complex menus or extensive tutorials. The same response described conversational interaction as supporting more human-feeling characters by encouraging the player to attribute personality to an entity that could respond directly to them.

The remaining comments identified practical and narrative considerations associated with the interaction approach and are shown in Table 6.54:

Practical or Narrative Consideration	Entries
Practical or Social Friction of Spoken Input	2
Desire for Greater Narrative Consequence	1

(Table 6.54: Practical and Narrative Considerations Related to HCI)

Two participants specifically described practical or social friction associated with spoken input. One chose not to speak because the experiment took place in an office with other people present, while another described feeling awkward speaking aloud and consciously altering their speech to make themselves easier for the system to understand. In the latter case, this reduced the perceived naturalness of the interaction.

Another participant, who reported using spoken input exclusively, expressed interest in whether different conversational choices would produce different narrative outcomes. They suggested that if substantially different conversations led to the same gameplay outcome, their sense of impact on the game world could be reduced.

These responses qualify the otherwise strongly positive structured findings from Section 05. NLI could be perceived as immersive and capable of supporting new forms of interaction, while spoken input could also create practical or social friction depending on the environment in which play occurred. The comments also reinforce

a distinction identified elsewhere in the analysis between conversational freedom and broader narrative consequence.

6.3.5.1 Research Question 4 Analytical Synthesis

Research Question 4: *How does the use of NLI systems, supported by written or spoken input, influence player immersion, intuitiveness, and observations of innovation in video game design?*

As established in Section 4.6.1, relevant open-text responses were analysed using reflexive thematic analysis at a predominantly semantic level. For RQ4, the analysis focused primarily on the explanations provided in Section 05 Question 5 and the additional observations provided in Question 8. These responses were considered alongside the structured measures of immersion, intuitiveness, perceived progression, future viability, and new design possibilities presented earlier in Section 6.3.5.

Initial semantic codes were compared across the responses and grouped into broader patterns of meaning before being reviewed and refined into four themes relevant to RQ4. The descriptive categories presented earlier in Section 6.3.5 remain question-level summaries and are therefore distinct from this cross-question thematic analysis. The full participant-level semantic coding for the new qualitative material relevant to RQ4 is provided in Appendix 5D, while Table 6.55 summarises the principal codes contributing to each theme.

Theme	Illustrative Semantic Codes
Natural-Language Input Increased Personal Expression and Immersion	Choosing exact wording; controlling tone and intent; expressing player personality; personalised responses; communicating naturally; fluid interaction; increased immersion through self-authored language
Intuitive Interaction Could Still Create Practical and Social Friction	Interaction felt intuitive; speaking felt natural; awkwardness speaking aloud; shared environments discouraged speech; deliberately altering speech for recognition; written input as an alternative
Removing Dialogue Restrictions Created a Trade-Off Between Freedom and Guidance	Freedom from predefined dialogue; asking personally relevant questions; greater control over interaction; conventional dialogue provided clearer guidance;

	difficulty knowing what NPCs knew; greater effort required to obtain information
NLI Was Viewed as Expanding Game-Design Possibilities Rather Than Universally Replacing Existing Interaction	New gameplay applications; reduced menu and tutorial overhead; tactical and racing-game uses; broader genre applications; future adoption; suitability varied by player and game; conventional dialogue still appropriate in some contexts

(Table 6.55: RQ4 Themes and Illustrative Semantic Codes)

The quantitative findings indicate strongly positive evaluations across the principal measures relevant to RQ4. Twenty of the 22 participants rated the use of written or spoken natural-language input as immersive, with 14 selecting the strongest positive response. A two-sided exact binomial test showed that this distribution differed significantly from an equal positive and negative response split, $p < .001$, with an exact 95% confidence interval of 70.8% to 98.9% for the positive response proportion.

All 22 participants rated the interaction as either very or somewhat intuitive, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0%. Twenty participants characterised the interaction approach as a progression relative to traditional menu-driven and dialogue-tree systems, $p < .001$, with an exact 95% confidence interval of 70.8% to 98.9%.

Participants also responded positively to the broader design implications of the approach. All 22 believed that the technology implementation opened up new design possibilities for games, $p < .001$, with an exact 95% confidence interval of 84.6% to 100.0%. All 22 also expected the approach to become more viable over time, although this latter measure was retained as descriptive evidence because it concerned expectations about future development rather than evaluation of a present characteristic of the prototype.

The reflexive thematic analysis of the open-text responses produced the following four themes relevant to RQ4:

1. **Natural-Language Input Increased Personal Expression and Immersion**

Participants frequently connected NLI with the ability to express themselves more directly. Responses referred to controlling wording, tone, and intent rather than selecting from predefined options, as well as being able to ask questions that reflected what the player was thinking at that moment. Several participants contrasted this with dialogue-tree systems where an available option could fail to represent precisely what they wanted their character to say.

This expressive freedom was also associated with immersion. Participants described the interaction as more personal, fluid, and natural when they could formulate their own responses rather than choose from a predetermined list. Some specifically connected the removal of semi-linear dialogue restrictions with feeling more involved in the interaction or more able to represent their intended character.

The qualitative responses therefore provide further context for the structured immersion result. The positive evaluation of immersion was not only associated with receiving responses from an NLI system, but with the opportunity to participate in conversation using language selected by the player. However, because the questionnaire combined written and spoken input within the structured measure, the quantitative result does not establish whether one input method was more immersive than the other.

2. Intuitive Interaction Could Still Create Practical and Social Friction

The structured results indicate that all participants perceived written or spoken NLI as intuitive to some degree. Several qualitative responses support this finding by describing communication through natural language as familiar or similar to speaking with another person. Participants also referred to being able to formulate questions naturally rather than learning a restricted set of available commands or dialogue options.

However, intuitive interaction did not necessarily mean frictionless interaction in every context. One participant chose not to use spoken input because other people were present in the playtesting space, while another described feeling awkward speaking aloud during play. The latter participant also reported consciously modifying their speech to make it clearer for the system, which made the interaction feel less natural.

These observations demonstrate an important distinction between conceptual intuitiveness and practical usability. Speaking naturally to a character may require little explanation, while the social environment in which a game is played can still make spoken interaction uncomfortable or undesirable. The availability of both written and spoken input therefore allowed the interaction model to accommodate circumstances in which one mode was less appropriate.

3. **Removing Dialogue Restrictions Created a Trade-Off Between Freedom and Guidance**

Greater freedom was one of the most frequently expressed advantages of the NLI approach. Participants valued choosing their own questions and responses rather than being directed through a limited set of dialogue options. This was associated with greater control over expression and the ability to pursue information according to the player's immediate interests.

The removal of predefined choices could, however, also remove information normally communicated through the interface. One participant described difficulty determining which NPCs possessed useful information and found it more frustrating to obtain a desired response because the system did not provide the guidance inherent in conventional dialogue options. Another response acknowledged that predetermined options could remain appropriate for games built around more tightly controlled narratives.

The findings therefore indicate a trade-off rather than a straightforward replacement of one interaction model with another. NLI increased expressive freedom, but that freedom could also require players to determine what to ask, which characters to approach, and how information might be obtained. Conventional dialogue systems restrict expression but can simultaneously communicate available narrative or gameplay pathways more explicitly.

4. **NLI Was Viewed as Expanding Game-Design Possibilities Rather Than Universally Replacing Existing Interaction**

The unanimous response to Question 7 indicates that participants perceived the NLI implementation as opening new design possibilities. The qualitative responses provide examples of what those possibilities might involve. Suggestions included reducing reliance on menus or explicit tutorial interfaces, communicating with pit

crews in racing games, issuing instructions to squad members in tactical games, and applying conversational NPC systems across a range of genres.

Several participants also considered how conversational interaction might affect NPC characterisation or future gameplay design. One response described how reciprocal conversation could encourage players to attribute greater personality to an NPC, while others anticipated broader future use of this form of interaction or suggested applications within existing games.

This enthusiasm was not equivalent to a view that NLI should replace existing interaction in every context. One participant explicitly argued that the approach may suit some players better than others and that not every game should use it, while another suggested that certain genres would benefit more than others. The practical concerns surrounding spoken interaction provide further evidence that different interfaces may remain appropriate according to game design, player preference, and the play environment.

Taken together, the findings for RQ4 indicate that participants generally perceived written or spoken NLI as immersive, intuitive, and capable of supporting new approaches to video game interaction. The opportunity to formulate personally selected language increased expressive freedom and was frequently associated with a more personal and immersive experience than selecting from predetermined dialogue options.

However, the findings also demonstrate that intuitiveness and freedom did not remove all interaction difficulties. Spoken input could create practical and social friction depending on the environment in which play occurred, while the removal of predefined dialogue options could make it less clear what information was available or how it should be obtained. Greater conversational freedom therefore introduced a corresponding reduction in some of the guidance provided by conventional interface structures.

Participants nevertheless consistently identified broader game-design possibilities arising from the NLI approach, ranging from different forms of NPC communication to alternatives to menu-based guidance and applications across multiple genres. These observations did not amount to universal support for replacing existing interaction systems. Instead, the findings suggest that NLI can expand the range of

interaction methods available to designers, with its suitability depending on the player, the play environment, and the intended design of the game.

6.3.6 Sample Context and Interpretive Considerations

An additional consideration when interpreting the findings is the context from which the participant sample was recruited. Participants were drawn from an academic games environment and included students and lecturers. As a result, the sample should not be treated as representative of a wider population of video game players.

Participants within this environment are likely to have differing levels of familiarity with game design, development, and critical analysis. This context may have influenced the level of detail contained within some responses, particularly where participants discussed areas such as NPC behaviour, dialogue systems, graphical presentation, interaction design, or possible future mechanics. However, the direction or extent of any such influence cannot be determined from the questionnaire data alone.

The narrative framing of the experimental game should also be considered when interpreting responses relating to realism. The NPCs within *Turing* were presented as robots rather than human characters, and several participants explicitly referred to this framing when discussing how natural or believable the interactions felt. Consequently, perceptions of realism may reflect both the conversational behaviour of the NLI system and participants' expectations of the fictional characters they were interacting with.

These factors do not invalidate the participant responses, but they define the context within which the findings should be interpreted. The results therefore describe the experiences and perceptions of this particular participant group during interaction with the experimental prototype and should not be generalised beyond that context without further research involving broader participant populations.

6.4 Integrated Findings Across the Research Questions

The analysis presented across the four research questions identifies several recurring relationships between NLI, player experience, NPC behaviour, and wider game design. Although each research question addresses a different aspect of the experimental game, the findings collectively suggest that participants evaluated NLI most positively when conversational freedom was supported by responsive

characters, appropriate contextual knowledge, and integration with wider narrative and gameplay systems.

Across RQ1, participants demonstrated consistently positive interest in the experimental approach. All participants expressed interest in seeing more games using a similar design, showed positive interest in playing comparable games, and indicated that they would be likely to recommend them. The qualitative analysis suggests that this interest was influenced by the freedom to construct individual questions and responses, curiosity about NPC behaviour, and the use of conversation as part of exploration, puzzles, worldbuilding, and narrative discovery. However, technical delays, repetitive or lengthy responses, and interface friction could interrupt the conversational flow that participants otherwise valued.

RQ2 further demonstrated that conversational freedom should be distinguished from wider narrative agency. Participants generally perceived the NPC interactions as encouraging freedom, and this result was supported by inferential testing. By comparison, the measure concerning whether participants felt they were driving the wider narrative did not reach the established threshold for statistical significance. This distinction suggests that allowing players to determine what they say and how they approach a conversation does not automatically provide influence over broader narrative outcomes. The qualitative findings similarly indicated that narrative agency depended on conversational choices producing meaningful consequences elsewhere in the game.

Perceptions of NPC realism also depended on more than the naturalness of language. Across RQ2 and RQ3, participants considered contextual knowledge, situational awareness, narrative framing, and responsiveness to the developing game state when evaluating whether characters were believable. The robotic framing of the NPCs was particularly relevant, as several participants assessed their behaviour according to whether it was appropriate for those fictional characters rather than whether it perfectly reproduced human conversation. Conversely, limited knowledge, scripted or repetitive responses, weak situational awareness, and technical delays could expose the boundaries of the system and reduce perceived naturalness.

RQ3 showed that participants generally evaluated the implemented NLI system positively in terms of its effectiveness within the video game environment.

Participants with experience of earlier natural-language or voice-based systems frequently described the experimental game as allowing broader and more flexible interaction than implementations based on keywords, fixed commands, or limited recognition. However, accurate recognition alone was not sufficient to produce a convincing interaction. Participants also evaluated whether NPCs could sustain conversation, understand context, provide useful information, and respond in ways that supported the wider game experience.

RQ4 extended these findings into HCI. Written or spoken natural-language input was generally perceived as immersive and intuitive, while most participants regarded the approach as a progression relative to conventional menu-driven or dialogue-tree interaction. The qualitative findings indicate that the ability to formulate personally selected language supported expression and personalisation but also introduced new interaction considerations. Spoken input could create practical or social discomfort depending on the play environment, while removing predetermined dialogue options could reduce the guidance normally provided by conventional interfaces.

Overall, the findings do not suggest that NLI should replace existing dialogue or interaction systems in all games. Instead, they indicate that NLI can expand the range of interaction approaches available to designers. Its value within the experimental game was most apparent when conversational freedom was connected with narrative context, game-state awareness, exploration, characterisation, and meaningful gameplay. The findings therefore position NLI as a design approach whose effectiveness depends on its integration with the wider game rather than on natural-language capability alone.

6.5 Summary

This chapter has presented and analysed the data collected from the 22 participants who interacted with the experimental game *Turing*. Structured questionnaire responses were examined through descriptive statistics and selected inferential tests, while open-text responses were analysed using reflexive thematic analysis. These forms of evidence were subsequently considered together through the four research questions.

Across the study, participants generally responded positively to the use of NLI within the experimental RPG. The findings identified strong participant interest in similar

game designs, positive evaluations of conversational freedom, NPC understanding, immersion, intuitiveness, and the broader possibilities of natural-language interaction. However, the analysis also identified important qualifications. In particular, the findings distinguished freedom within conversation from influence over the wider narrative, with the measure of player-driven narrative producing a less conclusive result than the measures concerning conversational freedom.

The qualitative findings further demonstrated that the perceived value of NLI depended on its relationship with the wider game. Participants valued conversational interaction when it supported exploration, characterisation, worldbuilding, puzzles, and narrative discovery, while response delays, repetitive or lengthy dialogue, limited contextual knowledge, weak situational awareness, and other interaction friction could reduce the naturalness and continuity of the experience. Perceptions of realism were similarly influenced by narrative framing and contextual responsiveness rather than by linguistic behaviour alone.

Altogether, the findings suggest that NLI can expand the forms of interaction available within narrative games, but that natural-language capability alone does not determine the quality of the player experience. Its effectiveness depends on how conversational freedom is connected with NPC knowledge, game-state awareness, narrative consequence, interface design, and the wider structures of the game. The following final chapter of this thesis will discuss these findings in relation to the wider research, revisit the research objectives and questions, identify the contributions of the study, and consider its limitations and opportunities for future research.

Chapter 07: Discussion and Conclusion

7.1 Introduction

Following the analysis of participant feedback and experimental results presented in the previous chapter, this chapter brings together the findings of the research and considers their wider implications. It reflects on the relationship between the pilot study and main experiment, discusses the findings against the literature reviewed in Chapter 2, revisits the research questions and objectives, and identifies the contributions and future directions arising from the study.

The chapter begins with a summary of the principal findings from the evaluation of the experimental prototype. This establishes the main patterns identified across player engagement, conversational freedom, narrative agency, NPC realism, immersion, intuitiveness, and the wider design possibilities associated with natural language interaction (NLI).

The next section reflects on the pilot study and considers how its preliminary findings developed through the main experiment. This comparison examines narrative design, NLI, and human-computer interaction (HCI), showing where the expectations identified during the pilot were reflected, qualified, or developed through direct interaction with *Turing*.

The experimental findings are then discussed in relation to the literature reviewed in Chapter 2. This discussion considers how the results align with, extend, or qualify existing work concerning narrative design, NPC believability, conversational freedom, NLI, player agency, and HCI. Particular attention is given to the distinction between freedom within conversation and influence over the wider narrative, together with the role of contextual knowledge, situational awareness, and narrative framing in shaping NPC interaction.

The chapter subsequently revisits each of the four research questions, bringing together the qualitative and quantitative findings to provide a direct response to the areas established at the beginning of the thesis. The original aims and objectives are then reconsidered in light of these findings, identifying the extent to which they were addressed and where the results introduced important qualifications.

The contributions to knowledge arising from the thesis are then presented across theoretical, methodological, empirical, and practical areas. These contributions

reflect the progression from the literature review and pilot study through prototype development, evaluation, and analysis, rather than arising from the experimental findings alone.

Finally, the chapter identifies recommendations for future research based on the limitations and opportunities revealed through the study. These include further investigation of narrative consequence, NPC memory and contextual awareness, longer-term interaction, broader participant groups, written and spoken input, interface guidance, scalability, localisation, procedural systems, and applications across different game genres.

The chapter concludes by drawing together the principal implications of the research and considering how NLI can contribute to narrative role-playing game (RPG) design when conversational capability is integrated with the wider structures of the game.

7.2 Summary of Thesis Findings

This thesis has investigated how NLI can support narrative design in RPGs, with a particular focus on non-player character (NPC) engagement, immersion, believability, and player interaction. The study was conducted through the design and evaluation of an experimental game prototype called *Turing*, which integrated conversational AI to enable dynamic and context-sensitive dialogue between players and NPCs.

The experimental evaluation, based on feedback from twenty-two participants, yielded several key findings, as follows:

1. Firstly, participants responded positively to the use of NLI within the experimental game, with NPC conversation frequently identified as a source of enjoyment and engagement. Conversational interaction was associated with exploration, characterisation, worldbuilding, puzzles, and narrative discovery, while the use of written or spoken natural-language input was also evaluated positively in relation to immersion and intuitiveness. All participants expressed a desire to see more games using a similar design approach, expressed positive interest in playing comparable games, and indicated that they would be likely to recommend similar games to others.

2. Secondly, the results identified generally positive perceptions of NPC realism and naturalness, although these evaluations were qualified. Participants

considered not only the language produced by NPCs, but also their contextual knowledge, situational awareness, responsiveness to the game state, and consistency with their narrative roles. The presentation of the characters as robots was particularly relevant, as several participants explained that believable behaviour did not necessarily require the NPCs to imitate human conversation. Technical limitations including delayed responses, repetitive or lengthy dialogue, limited contextual knowledge, and occasional speech or interaction errors could reduce this sense of natural interaction.

3. Thirdly, participants consistently recognised the role of responsive NPCs in providing narrative and gameplay context. All twenty-two participants felt that NPC interaction provided context for the game and its mechanics, while twenty-one rated the NPCs positively in relation to instructional delivery. The results also identified an important distinction between conversational freedom and wider narrative agency. Eighteen participants felt that NPC interaction encouraged player freedom, whereas sixteen felt that the narrative was being driven by them to at least some extent. The latter result did not differ significantly from an equal response split at the established threshold. The findings therefore suggest that NLI supported expressive and conversational freedom more consistently than it produced a sense of influence over the wider narrative.

4. Finally, the experiment demonstrated strong participant interest in the possibilities associated with NLI. Most participants reported that they had not previously played a game they considered similar to *Turing*, while those with experience of earlier NLI implementations frequently described the experimental system as allowing broader and more flexible interaction than systems based on keywords, prescribed commands, or limited forms of language recognition. Participants also unanimously considered the implementation to open new possibilities for game design, although responses indicated that NLI would not necessarily be appropriate for every player, genre, or gameplay context.

These findings collectively support the continued exploration of NLI within narrative-driven game design, particularly in genres such as RPGs where character

interaction, exploration, and player expression are central to the experience. Rather than positioning natural-language systems as a universal replacement for established dialogue approaches, the findings suggest that their value depends on how conversational freedom is integrated with NPC knowledge, narrative context, gameplay systems, and meaningful consequences within the wider game.

7.3 Reflections on the Pilot Study

The pilot study played an important role in shaping the methodological and conceptual direction of this research. Conducted prior to the design of the full experimental framework, it provided an early exploration of key themes that emerged from the literature review. Specifically, it investigated the narrative role of NPCs, the feasibility of NLI in gaming, and evolving player expectations within HCI. The findings not only informed the experiment but also established a useful baseline for comparison with the results obtained in the main study.

7.3.1 Narrative Design

The pilot study established a foundational understanding of how players engage with narrative in games, particularly highlighting the perceived importance of NPCs in delivering narrative content. Participants consistently identified NPCs as integral to both the structure and experience of narrative, with a large majority of respondents rating NPCs as very or somewhat important to a game's narrative success. Furthermore, players showed a clear preference for narrative devices such as dialogue, environmental storytelling, and character-driven lore, with specific emphasis on quests, player choice, and interaction as mechanisms through which narrative advances.

These preferences directly informed the design of the experimental prototype, which aimed to emphasise NPC interaction as a primary method of narrative delivery. The main study provided an opportunity to examine this design approach through direct player interaction rather than the more speculative responses collected during the pilot. Participants generally regarded NPCs as important to the narrative experience, while the conversational system was frequently associated with exploration, worldbuilding, puzzle solving, characterisation, and the discovery of narrative information.

However, the main study also provided a more qualified understanding of the relationship between NPC interaction and narrative agency. Participants responded

positively to the freedom offered by NPC conversation, with eighteen of the twenty-two participants reporting that interaction encouraged player freedom. By comparison, sixteen participants felt that the wider narrative was being driven by them to at least some extent, with this result falling narrowly outside the established threshold for statistical significance. The findings therefore suggest that the conversational freedom identified during the pilot translated more consistently into freedom of expression and exploration than into control over wider narrative outcomes.

Another key alignment between the pilot and the main study concerned player expectations for NPC personality variation and responsiveness. In the pilot, participants identified diversity in NPC personalities as important to narrative quality, including elements such as distinct motivations, attitudes, and general quirks. This finding influenced the design of the character profiles within *Turing*, which incorporated different accents, personalities, roles, and styles of speech into NPC dialogue responses. In the main study, participants explicitly commented on NPC personality and responsiveness, with these qualities contributing to engagement and perceptions of believability.

The main experiment also developed the understanding of what participants considered believable NPC behaviour. Rather than evaluating characters solely according to how closely they reproduced human conversation, participants considered whether their behaviour was appropriate to the narrative context. Several specifically referred to the NPCs being robots when discussing realism and naturalness, suggesting that consistency with the fictional role of a character could be as important as human-like behaviour. This adds a further consideration to the pilot findings around character personality by demonstrating that believability depended not only on variation between characters, but also on coherence between behaviour, narrative framing, and the role of the NPC within the game world.

Additionally, both studies reflected an interest in narrative coherence alongside more flexible forms of interaction. Pilot-study participants identified issues with static, disjointed, or overly scripted NPCs in existing games, noting that these could disrupt immersion. Similar considerations appeared within the main experiment, where participants responded positively when NPCs provided relevant information, recognised aspects of the surrounding game state, or responded appropriately to player actions. Conversely, limited situational awareness, insufficient contextual

knowledge, scripted behaviour, and repetitive responses could expose the boundaries of the system and reduce the natural quality of the interaction.

The comparison between the two studies therefore provides a progression from player expectations towards observations grounded in direct interaction with an NLI-driven prototype. The pilot identified qualities that participants considered desirable in narrative NPCs, while the main experiment demonstrated how those qualities were perceived when implemented within a playable RPG environment. This provided a different form of evidence concerning the relationship between conversational freedom, NPC responsiveness, characterisation, and narrative context.

Overall, the pilot study's findings around narrative design were broadly reflected in the results of the main experiment. Across both phases, NPCs were perceived as important components of narrative interaction, while coherence, contextual responsiveness, and character variation remained relevant to participant evaluations. The main study also introduced an important qualification by demonstrating that increased conversational freedom did not automatically produce greater control over the wider narrative. Instead, the narrative value of NLI-driven NPCs appeared to depend on how conversational interaction was connected with characterisation, contextual knowledge, game-state responsiveness, and meaningful consequences within the wider game.

7.3.2 Natural Language Interaction

The pilot study also offered valuable preliminary insight into player familiarity with, and attitudes toward, NLI in games. While less than half of the participants reported having played a game with voice interaction capabilities, there was widespread recognition of its potential. Many expressed interest in games that used conversational systems, particularly where such systems could provide greater responsiveness and flexibility than established dialogue approaches. At the same time, participants reported scepticism about existing implementations, describing previous experiences with NLI as frustrating due to issues with accuracy, responsiveness, and overly limited dialogue structures.

These insights shaped the design and development of the experimental prototype, which sought to explore many of the concerns raised in the pilot. Notably, the main study shifted the discussion from hypothetical perspectives to direct interaction with

an NLI-driven NPC system. Participants were therefore able to reflect on an implemented system that used conversational AI to interpret and respond to written or spoken natural-language input rather than considering how such an approach might function in theory.

This shift provided a more detailed understanding of player responses to NLI in practice. In contrast to the cautious optimism expressed in the pilot, participants in the main study generally evaluated the interaction approach positively. All participants indicated that they would like to see more games using a similar design approach, and conversational NPC interaction was frequently identified as one of the most enjoyable aspects of *Turing*. Participants associated this freedom with exploration, curiosity, worldbuilding, and the ability to communicate with characters using personally selected questions and responses rather than relying on predefined dialogue choices.

However, the comparison also shows important continuities. Like the pilot, participants in the main experiment identified limitations concerning response accuracy, conversational flow, and system responsiveness. These included delayed responses, occasional misunderstandings, lengthy or repetitive dialogue, and limitations in NPC knowledge. The main study therefore did not remove the concerns identified through the pilot but demonstrated that participants could still evaluate the system positively while encountering individual failures. In particular, twenty-one of the twenty-two participants rated NPC understanding positively, despite qualitative responses identifying occasional misunderstandings and speech or text-to-speech errors.

Another important point concerns how players conceptualised the role of NLI within narrative interaction. In the pilot, participants identified NPC dialogue and player choice as important to narrative progression while also recognising the limitations of pre-scripted interaction trees. The main study provided practical evidence that free-form conversation could support a more exploratory approach to narrative discovery. Participants described deciding which questions to ask, pursuing information according to their own interests, testing the limits of NPC responses, and using conversation to discover quests, world information, and other narrative content. This suggests that NLI can broaden the ways in which players engage with narrative material, although the findings also demonstrated that conversational freedom did not automatically result in wider narrative agency or consequence.

The main experiment also provided a clearer basis for comparing *Turing* with earlier forms of NLI. Twenty-one of the twenty-two participants reported previous experience with virtual assistants, while eleven had previously played games using written or spoken NLI. However, familiarity with virtual assistants should be distinguished from direct comparison, as only one participant explicitly compared *Turing* with Siri. More substantial comparisons were made with previous games and game-related systems, including implementations based on keywords, prescribed commands, single-word input, and relatively simple language recognition. Participants with relevant experience frequently described *Turing* as allowing broader, more flexible, or more developed interaction than these earlier systems.

These comparisons also demonstrated that participants evaluated NLI through more than recognition accuracy alone. The ability to ask NPCs to expand upon or explain information, phrase questions in different ways, and continue conversations beyond fixed command structures contributed to perceptions of effectiveness. At the same time, conversational realism remained dependent on response quality, contextual knowledge, conversational depth, and natural phrasing. An NPC could understand the player correctly while still producing an unsatisfactory interaction if its knowledge of the game world or surrounding situation was insufficient.

Overall, the pilot study identified both player interest and scepticism surrounding NLI, while the main experiment allowed those expectations to be examined through direct interaction with a playable implementation. The comparison suggests that NLI can support engaging and flexible forms of player-NPC interaction when it is integrated with wider narrative and gameplay systems, but also reinforces the importance of responsiveness, contextual knowledge, conversational depth, and technical reliability. The progression from hypothetical expectations in the pilot to direct player experience in the main study therefore strengthens the understanding of both the opportunities and limitations associated with NLI in narrative game design.

7.3.3 Human-Computer Interaction

The pilot study also investigated the increasingly dynamic nature of HCI within the context of games, particularly in relation to interface design, system responsiveness, and input methods. Participants identified developments in areas such as AI, accessibility, and voice interaction as relevant to the changing relationship between players and game interfaces. These perspectives framed an important part of the

research focus, informing the development of *Turing* around NLI through both written and spoken input.

A major finding from the pilot was the emphasis on player preferences for seamless and intuitive interfaces that integrate naturally with the game experience. Participants expressed frustration with clunky or intrusive HCI systems and described positive experiences in terms of clarity, immersion, and fluid feedback. Similar considerations appeared in the main experiment, where all twenty-two participants rated the use of written or spoken natural-language input as at least somewhat intuitive, while twenty of the twenty-two rated the interaction towards the immersive end of the scale. Participants frequently connected this experience with the ability to formulate their own questions and responses rather than selecting from predefined dialogue options.

However, the comparison between the pilot and the main study also reveals important developments in the understanding of usability. In the pilot, participants largely considered how NLI might function within a game setting, with some raising concerns about technical limitations or uncertainty surrounding existing implementations. The main experiment allowed participants to interact directly with an implemented system and demonstrated that natural-language input could be perceived as intuitive despite the presence of technical and interaction friction. Response delays, occasional misunderstandings, lengthy dialogue, and other interruptions remained visible within the experience, indicating that intuitiveness did not necessarily mean that interaction was consistently frictionless.

The main experiment also highlighted a distinction between the conceptual intuitiveness of NLI and the practical circumstances in which it is used. One participant chose not to use spoken input because other people were present within the playtesting environment, while another described feeling awkward speaking aloud and consciously modifying their speech to improve recognition. These observations indicate that an input method can appear intuitive in principle while still introducing social or practical barriers depending on the environment in which play takes place. The availability of written input alongside speech therefore provided an alternative where spoken interaction was less appropriate.

Notably, feedback from the main experiment also showed how some players adapted their communication to the system. Participants described changing

phrasing, considering how questions should be constructed, or experimenting with different forms of input to determine what NPCs understood. This reflects an important HCI consideration within natural-language systems, as communication involves both the player interpreting the capabilities of the system and the system responding to player input. Where interaction worked effectively, this flexibility supported experimentation and personal expression. Where players felt required to alter their natural behaviour to accommodate the system, however, the interaction could become less natural.

The pilot study also identified hardware access and familiarity with peripherals as relevant HCI considerations. Most participants indicated access to microphones and headsets, which informed the decision to allow *Turing* to support spoken interaction using commonly available peripherals. The main experiment subsequently allowed participants to use written or spoken input within a consistent hardware and testing environment. This provided a practical basis for evaluating both interaction methods without requiring specialist input equipment, while also demonstrating that the suitability of spoken interaction could depend on factors beyond hardware availability alone.

Another connection between the two studies was the importance of responsiveness and feedback. In the pilot, this was framed around frustration with systems or NPCs that did not respond appropriately and could disrupt the sense of interaction. The main experiment demonstrated a similar relationship. Participants generally evaluated NPC understanding positively, but response delays, repetition, misunderstandings, and limited contextual knowledge could interrupt conversational flow. Responsive feedback therefore remained important not simply as a technical characteristic, but because it affected whether communication felt continuous, understandable, and appropriate to the surrounding game experience.

In summary, the pilot study provided a foundational understanding of the challenges and opportunities associated with game-based HCI, while the main experiment allowed these considerations to be examined through direct interaction with a playable natural-language system. The findings indicate that written or spoken NLI can provide an intuitive and immersive interaction method, particularly where players are able to express themselves without relying on predefined dialogue choices. At the same time, the comparison demonstrates that intuitive interaction does not remove the need to consider responsiveness, interface guidance, social context,

player preference, and the environment in which the game is played. The findings therefore position NLI as an additional interaction approach whose suitability depends on how it is integrated with the wider player experience rather than as a universal replacement for established interface methods.

7.4 Discussion of Results in Relation to the Literature

This section discusses the findings of the experimental study in relation to the existing literature reviewed in Chapter 2. By examining how the results align with, extend, qualify, or challenge prior research in narrative design, NLI, and HCI, this discussion aims to contextualise the findings of the study within broader academic debates. Each subsection addresses a specific thematic area, reflecting on how the experimental outcomes relate to the theories and frameworks presented in the literature. In doing so, this section establishes a foundation for evaluating the study's implications for future research and practice.

7.4.1 Narrative Design

The experiment's results align with theoretical insights from Koenitz and Jenkins, who distinguish between embedded and emergent narrative structures in game design (Koenitz, 2024; Jenkins, 2004). Participants engaging with *Turing* frequently connected their interactions with NPCs to exploration, worldbuilding, narrative discovery, and the process of uncovering information. Rather than receiving all narrative information through fixed dialogue sequences, players were able to determine which questions they wanted to ask and which areas of the game world they wanted to investigate. This reflects Jenkins' description of emergent narrative as arising through player interaction with a game's systems, although the findings also demonstrate that conversational freedom should not automatically be treated as evidence of wider narrative control.

This distinction is important when considering player agency. Participants generally perceived the NLI-driven interactions as supporting freedom in how they communicated with NPCs, with eighteen of the twenty-two participants responding positively to this measure. By comparison, sixteen participants felt that the narrative was being driven by them to at least some extent, with this distribution falling narrowly outside the established threshold for statistical significance. The findings therefore provide stronger evidence for expressive and conversational freedom than for control over the wider narrative. In relation to Jenkins' distinction between

embedded and emergent narrative, *Turing* allowed players to vary how they accessed, interpreted, and discussed narrative content, but this did not necessarily mean that the underlying events or outcomes of the game changed to the same extent.

The emphasis placed on NPCs also echoes broader theoretical positions concerning the relationship between narrative structure and interactive freedom. As discussed by Koenitz and Veloya, NPCs can function as mediators between narrative content and player interaction, particularly within RPGs (Koenitz, 2024; Veloya, 2023). Within the experimental game, twenty-one of the twenty-two participants rated NPCs as very or somewhat important to the narrative experience. This finding aligns with Warpefelt and Verhagen's concept of NPC 'characterhood', where NPCs operate as more than static game elements by portraying roles and interacting meaningfully with the player (Warpefelt & Verhagen, 2017).

Participant responses provide further context for this relationship. NPCs were valued not only for supplying information, but also for their personalities, responsiveness, roles within the colony, and ability to support exploration and gameplay. The qualitative findings described conversations as opportunities to discover quests, investigate the world, obtain guidance, and learn more about individual characters. These observations support the broader argument that NPCs can bridge ludic and narrative functions, contributing both to what the player does and to how the game world is interpreted. However, the questionnaire measure concerning NPC importance should remain distinct from the effects of NLI itself, as the question establishes the importance of the characters rather than demonstrating that NLI alone caused the positive narrative evaluation.

The findings can also be considered in relation to Koenitz's System, Process, Product model. The experimental game contained a structured narrative world, designed character roles, tasks, locations, and predetermined information, while the process through which participants encountered this material could vary according to the questions they asked and the conversations they pursued. In this sense, NLI introduced flexibility into the process through which the authored material was experienced. Participants could reach similar narrative information through different formulations, pursue additional questions, or explore details that were personally relevant to them. This reflects the hybridity between structured and player-influenced

narrative discussed by Koenitz, while also showing that variation in the process of interaction does not necessarily require completely different narrative outcomes.

A similar qualification applies when relating the findings to Lessard and Paré-Chouinard's discussion of dramatic situations as a heuristic for emergent narrative systems (Lessard & Paré-Chouinard, 2022). *Turing* did not explicitly implement their dramatic-situation framework, and the study therefore cannot directly evaluate the effectiveness of that design method. However, participants did describe conversational experiences involving investigation, discovery, attempts to manipulate or challenge NPCs, and experimentation with how characters might respond. These interactions share qualities with the concept of 'tellability', where story-worthy moments arise from the conditions produced through player and system interaction.

The variation between participant experiences is also relevant here. Different players asked different questions, discovered different information, tested different conversational boundaries, and approached tasks in different ways. NLI therefore introduced variation at the level of conversation and narrative discovery even where the underlying game structure remained comparatively stable. This provides some support for the broader principle that flexible character interaction can contribute to individualised narrative experiences. However, it also qualifies stronger interpretations of narrative co-authorship. The evidence demonstrates that participants could shape how conversations unfolded and how narrative material was explored, but it does not establish that they consistently determined what wider narrative events occurred or how the overall story concluded.

This distinction adds a useful perspective to the discussion of co-created narrative within the literature. Lessard and Paré-Chouinard describe emergent systems in which player interaction contributes to the creation of narrative events, while the literature reviewed in Chapter 2 also considers NLI as a means through which players might shape motivations, relationships, and story outcomes. The experimental findings suggest that conversational authorship can operate at a more localised level. Players influenced wording, tone, questioning, information discovery, and the immediate direction of an exchange, but broader narrative agency depended on whether those interactions were connected to consequences elsewhere in the game. Conversational freedom can therefore form part of narrative co-creation without necessarily producing full co-authorship of the wider plot.

The experimental findings also relate to Arinbjarnar et al.'s discussion of interactive drama systems (Arinbjarnar, et al., 2009). Participants repeatedly identified freedom, exploration, and responsive NPC interaction as positive aspects of the experience, which reflects the blending of authored narrative content with player interaction associated with interactive drama. However, *Turing* differed from formal drama-managed systems such as those considered by Arinbjarnar et al. The prototype did not employ a central drama manager capable of restructuring plot events in response to player behaviour. Instead, it relied on designed narrative structures, contextual information, game-state updates, and conversational prompts to support responsive interaction.

This difference helps explain the distinction found between conversational freedom and wider narrative agency. NPCs could redirect players towards information, provide task-related guidance, recognise some changes in game state, and adapt their conversational responses, but these forms of reactivity did not necessarily alter the structure of the wider narrative. The experiment therefore demonstrates how some qualities associated with interactive drama can be supported through conversational interaction without reproducing the more extensive narrative adaptation described in formal drama-management systems. This also identifies an area for further development, where deeper connections between NLI, game state, and narrative consequence could extend conversational freedom into broader forms of narrative influence.

In terms of genre considerations, the experimental game remained recognisable within the narrative-focused genres identified through the literature. Twelve of the twenty-two participants primarily classified *Turing* as an RPG, while seven described it as an adventure game. Two participants selected simulation and one selected strategy. These findings provide contextual evidence that the prototype was generally understood within the RPG and adventure frameworks around which it had been designed. The additional classifications also reflect hybrid qualities within the prototype, although the results do not establish that NLI itself caused participants to interpret the game across different genre categories.

The role of NPCs within these genre structures further aligns with Warpefelt and Verhagen's discussion of NPCs as both functional and narrative elements. Participants valued NPCs for providing game information, supporting tasks, and contributing to the world and narrative. Twenty of the twenty-two participants

considered improved access to information beneficial to NPC narrative performance, all twenty-two reported that NPC interaction provided context for the game and its mechanics, and twenty-one rated the NPCs positively in relation to instructional delivery. These findings support the literature's argument that NPCs can occupy both ludic and narrative roles, functioning simultaneously as characters within the fiction and as mechanisms through which the player understands and progresses through the game.

The distinction between realism and believability presented by AlJammaz et al. provides a particularly useful lens through which to interpret the experimental findings (AlJammaz, et al., 2023). The literature distinguishes realism, which is concerned with alignment to human behaviour, from believability, which depends more broadly on whether a character appears coherent and convincing within its role. This distinction became apparent in the participant responses to *Turing*. While eighteen participants rated the NPCs towards the realistic end of the questionnaire scale and seventeen rated their behaviour and environmental perception towards the natural end, the majority of positive responses were within the more moderate 'Somewhat' categories rather than the strongest options.

The qualitative responses help explain this result. Several participants explicitly stated that realism and naturalness were difficult to judge because the characters were robots. Some behaviours that might have appeared unnatural for human characters were nevertheless regarded as believable within the fictional framing of robotic NPCs on an abandoned colony. These observations strongly align with the importance of role contextualisation discussed by AlJammaz et al., Lankoski and Björk, and Mateas (AlJammaz, et al., 2023; Lankoski & Björk, 2007; Mateas, 1999). Rather than requiring perfect human imitation, believability depended partly on whether NPC behaviour was consistent with the role, setting, and expectations established by the game.

Lankoski and Björk's patterns concerning 'Awareness of Surroundings' and 'Contextual Conversational Responses' are also reflected closely in the findings (Lankoski & Björk, 2007). Participants responded positively when NPCs appeared to recognise collected items, acknowledge nearby characters or objects, or adapt their responses following changes in game state. Conversely, they noticed when characters failed to acknowledge surrounding events, lacked information that appeared relevant to their role, or continued behaving as though an earlier game

state remained unchanged. The same characteristic could therefore strengthen believability when present and expose the limitations of the system when absent.

This relationship between information access and believability also connects directly with Mahmoud et al.'s work on NPC perception and Hierarchical Task Network planning (Mahmoud, et al., 2014). Their system provides NPCs with controlled access to environmental information so that decisions can respond to what characters have perceived and learned. *Turing* did not implement real-time sensory perception or HTN planning, instead providing NPCs with contextual information through prompts, memory, and selected game-state updates. Nevertheless, twenty of the twenty-two participants considered improved informational access beneficial to NPC narrative performance, supporting the broader proposition that what an NPC knows affects how convincingly it can fulfil its role.

The qualitative findings further qualify this relationship. Participants valued NPCs when they possessed appropriate knowledge of the game world and current circumstances, but limitations became apparent when characters lacked information that the player expected them to have. This suggests that conversational capability and informational awareness should not be treated as interchangeable. An NPC may be capable of interpreting a natural-language question while still producing an unsatisfactory response if it lacks the contextual knowledge required to answer appropriately. In this respect, the findings support Mahmoud et al.'s emphasis on environmental awareness while demonstrating its relevance to conversational NPCs: broader linguistic flexibility increases the range of questions a player may ask, which in turn increases the importance of ensuring that the character has appropriate information with which to respond.

Overall, the experiment broadly aligns with literature describing NPCs as important mediators between narrative, gameplay, and player interaction, while also providing several qualifications to stronger claims surrounding emergent narrative and agency. NLI allowed participants to communicate more freely, explore narrative information through personally selected questions, and interact with NPCs that could respond with a degree of contextual flexibility. However, this expressive freedom did not automatically translate into control over the wider narrative. The findings therefore suggest that NLI can support emergent qualities within conversation and narrative discovery, but wider narrative agency requires those conversations to be connected with meaningful game-state changes and narrative consequences. Similarly, NPC

believability depended not only on the naturalness of generated dialogue, but on narrative framing, character role, contextual knowledge, and awareness of the surrounding game state.

7.4.2 Natural Language Interaction

The results of the experimental study broadly support Lessard's argument that NLI offers a more expressive alternative to traditional menu-driven dialogue systems (Lessard, 2016). Participants frequently valued the ability to construct their own questions and responses rather than selecting from predefined dialogue options. This conversational freedom was associated with exploration, curiosity, personal expression, and immersion, with participants describing opportunities to pursue information according to their own interests and experiment with how NPCs might respond.

These findings also extend the distinction identified in Chapter 2 between the freedom to provide natural-language input and the ability of a system to interpret and act upon that input. Earlier parser-based interactive fiction allowed players to construct written commands while remaining restricted by the vocabulary and structures recognised by the system. *Turing* allowed a broader range of phrasing and conversational input, with participants who had experience of previous NLI implementations often describing the experimental system as more flexible than systems based on keywords, prescribed commands, or limited forms of language recognition. However, the experiment also demonstrated that freedom of input did not automatically result in unrestricted influence over the game.

This qualification is particularly important when considering Lessard's discussion of conversational freedom and emergent storytelling. Participants could shape the immediate direction of conversations, decide what information to pursue, and formulate personally selected questions. However, the results concerning wider narrative agency were less conclusive than those concerning conversational freedom. NLI therefore provided greater freedom over how players interacted with NPCs than over the wider narrative consequences resulting from those interactions. This suggests that conversational agency and narrative agency should remain distinct when evaluating natural-language systems in games.

At the same time, the experiment reflects Lessard's identification of coherence and miscommunication as continuing challenges for NLI. Participants generally evaluated

NPC understanding positively, with twenty-one of the twenty-two participants rating comprehension towards the positive end of the scale. Nevertheless, the qualitative responses identified occasional misunderstandings, speech or text-to-speech errors, delayed responses, repetitive dialogue, and situations where NPC knowledge was insufficient for the question being asked. Participants could therefore regard the system as effective overall while still recognising individual failures.

These observations relate to Wardrip-Fruin's discussion of the 'Eliza Effect', where the apparent intelligence of a conversational system can be disrupted when the boundaries of its understanding become visible (Wardrip-Fruin, 2012). Within *Turing*, these boundaries were not limited to whether the system correctly interpreted the player's language. Participants also noticed when an NPC understood a question but lacked appropriate contextual information, responded with excessive or repetitive dialogue, or behaved in a way that appeared scripted. The findings therefore suggest that maintaining conversational credibility requires more than accurate language recognition; it also depends on response quality, contextual knowledge, and continuity within the surrounding game experience.

The results also align with Brusk and Björk's argument that dialogue can function as an active gameplay system rather than solely as a mechanism for delivering narrative information (Brusk & Björk, 2009). Within *Turing*, conversations were used to obtain instructions, investigate the world, discover information, locate activities, and progress through tasks. Participants consequently engaged with dialogue as part of the gameplay process rather than treating it only as exposition. This supports the literature's view that NLI can integrate conversation more closely with game mechanics when the information exchanged has a functional role within play.

This connection is particularly apparent in relation to Lessard's concept of conversational puzzles. *Turing* did not reproduce the formal conversational puzzle structures of projects such as *A Tough Sell* or *SimHamlet*, where specific conversational goals form the basis of the challenge. However, participants sometimes described needing to determine what questions to ask, trying alternative approaches, or identifying which NPC possessed useful information. Conversation could therefore become part of the problem-solving process, even where the interaction was not designed as a discrete conversational puzzle.

One participant also proposed an interrogation mechanic in which appropriate questions could be used to uncover clues, demonstrating that participants themselves recognised further possibilities for building gameplay around natural-language questioning. This complements Lessard's examples by suggesting that the value of NLI as a gameplay mechanic may lie not simply in replacing dialogue options, but in designing objectives where determining what to ask becomes part of the challenge.

The findings provide a more qualified relationship with the literature surrounding nonlinear and collaborative narrative creation. Chapter 2 discusses examples such as *Façade* and *SimProphet*, where player input can contribute directly to the evolving narrative and where NPCs can take an active role in initiating or redirecting interaction. *Turing* provided greater variability in how conversations unfolded and which information participants discovered, but the underlying narrative structure remained more stable. Variation in conversation should therefore not be treated as equivalent to branching narrative outcomes or evidence of replayability.

Similarly, the mixed-initiative interaction described in the literature was only partially represented within the experimental prototype. NPCs could provide guidance, redirect players towards other characters or tasks, and respond according to some aspects of game state, but participants generally remained responsible for initiating and directing conversations. *Turing* therefore operated more strongly as a player-led conversational system than the shared conversational authorship demonstrated in systems such as *Façade*, where NPCs can introduce topics, interrupt the player, and actively shape the direction of an encounter.

This difference is useful when considering Bontchev's discussion of adaptive and personalised systems (Bontchev, 2016). The prototype incorporated contextual information and game-state updates that allowed NPC responses to reflect some changes within the experience. Participants noticed positively when characters acknowledged completed actions, relevant objects, or changing circumstances. However, this adaptation did not amount to the long-term player modelling, evolving relationships, or procedurally generated narrative arcs proposed within more advanced adaptive systems.

The experiment therefore provides support for contextual adaptation at the level of individual interactions while also illustrating the limits of that adaptation. Participants

valued NPCs that appeared aware of the developing game state, but they also identified situations where contextual knowledge or situational awareness was insufficient. This reinforces Bontchev's emphasis on coherence in adaptive systems: expanding the freedom of player input also increases the range of situations and information that an NPC may be expected to understand.

More broadly, the findings suggest that the effectiveness of NLI should not be evaluated through language recognition alone. Participants judged the system according to what conversational flexibility allowed them to do: ask follow-up questions, investigate information, explore NPC personalities, solve problems, and communicate in ways that more restricted systems could not easily accommodate. Twenty-one participants rated NPC understanding positively, while participants with relevant previous experience commonly described *Turing* as offering broader interaction than earlier command- or keyword-based implementations.

However, broader conversational capability also created greater expectations concerning conversational depth and contextual knowledge. Participants could formulate questions that moved beyond the information available to an NPC, making the limits of the character's knowledge more visible. This suggests that improvements in natural-language understanding alone do not necessarily produce more convincing NPC interaction. The information available to the character, its relationship with the game state, and the design of the surrounding narrative systems must develop alongside the language interface.

Overall, the findings broadly support the literature's position that NLI can provide more expressive and gameplay-integrated forms of player-NPC communication. *Turing* demonstrated that free-form language can support exploration, problem-solving, narrative discovery, and personal expression while allowing participants to interact beyond predefined dialogue options. At the same time, the experiment qualifies stronger claims concerning emergent storytelling, shared narrative agency, and adaptive relationships. These outcomes depended not simply on allowing natural-language input, but on how that input was connected with NPC knowledge, game state, conversational initiative, and meaningful consequences elsewhere in the game. NLI therefore provides a mechanism for expanding conversational possibility, while the wider design of the game determines how far those possibilities extend into narrative and gameplay outcomes.

7.4.3 Human-Computer Interaction

The results of the experiment reflect many of the key distinctions Barr et al. identify between traditional HCI and game-oriented HCI (Barr, et al., 2007). In *Turing*, the natural-language interface was not designed solely to minimise difficulty or maximise efficiency, but to support narrative interaction, player expression, and immersion. Twenty of the twenty-two participants rated the use of written or spoken natural-language input towards the immersive end of the scale, while all twenty-two considered the interaction at least somewhat intuitive. These findings align with Barr et al.'s argument that video game interfaces should be evaluated not only according to functional usability, but also according to how effectively they contribute to the intended player experience.

Participant responses provide further evidence of this relationship between interface and experience. The ability to formulate individual questions and responses was frequently associated with personal expression, exploration, and involvement in NPC interaction. Rather than selecting from predefined dialogue options, participants could determine how they wanted to phrase an input and which information they wished to pursue. In this respect, the NLI interface functioned as a connection between the player and the narrative world, supporting both functional communication and the opportunity for more personally directed interaction.

However, the findings also demonstrate that intuitive interaction should not be equated with frictionless interaction. While all participants evaluated the written or spoken NLI system as intuitive to some degree, technical delays, occasional misunderstandings, lengthy responses, interface interruptions, and limitations in contextual knowledge could disrupt the conversational experience. These points of friction were not necessarily incompatible with an overall positive evaluation, but they demonstrate that the usability of NLI in games involves more than whether a player understands how to provide input.

This qualification is consistent with Barr et al.'s distinction between conventional usability and the wider values associated with game interfaces. Some forms of friction may contribute to challenge or the intended game experience, while others can interrupt interaction without serving a clear design purpose. Within *Turing*, deciding what to ask an NPC could form part of exploration or problem-solving, whereas waiting for a delayed response or encountering a misunderstanding generally interrupted conversational flow. The findings therefore suggest that the role

of friction within natural-language interfaces should be considered in relation to whether it contributes meaningfully to gameplay or arises from limitations in the interaction system.

The experiment also aligns with Allison et al.'s observations concerning how players approach intelligent game characters (Allison, et al., 2018). Their research identifies exploratory and functional communication strategies, where players may either attempt to accomplish a particular task or test what a conversational character is capable of understanding. Similar behaviour appeared within *Turing*. Participants described experimenting with phrasing, asking unexpected questions, attempting to confuse or mislead NPCs, and exploring the limits of what characters could discuss. These behaviours suggest that participants were not simply using NLI as a replacement for selecting dialogue options; the apparent openness of the system encouraged them to investigate its capabilities.

This experimental behaviour also relates to player expectations. Allison et al. argue that assumptions about intelligent characters influence the language players choose and the range of responses they expect from a system. The main study provides some support for this principle, although the source of these expectations should be treated carefully. Twenty-one of the twenty-two participants had previously used a virtual assistant, and eleven had experience of games involving written or spoken NLI. However, familiarity with virtual assistants did not result in widespread explicit comparison with them during the open responses. Previous game-based NLI systems provided a clearer source of direct comparison, while only one participant specifically compared *Turing* with Siri. The findings therefore support the broader role of prior experience in shaping expectations without demonstrating that virtual assistants themselves were the dominant comparison used by participants.

When expectations were not met, the resulting breakdowns also reflect the challenges identified by Allison et al. and Wardrip-Fruin. Participants generally rated NPC understanding positively, but occasional misunderstandings, scripted responses, limited knowledge, and weak situational awareness could reveal the boundaries of the system. These instances relate to the 'Eliza Effect', where users may initially attribute a greater degree of understanding to a conversational system before encountering behaviour that exposes its limitations (Wardrip-Fruin, 2012). Importantly, the findings suggest that these boundaries were not exposed through recognition errors alone. An NPC could understand the player's wording while still

appearing limited because it lacked sufficient knowledge of the task, environment, or narrative circumstances.

Narrative framing provided one method through which these expectations could be managed. Allison et al. discuss the use of diegetic framing to contextualise the limitations of intelligent characters, and the findings from *Turing* provide a clear point of comparison. Several participants explained that unusual or imperfect conversational behaviour remained believable because the NPCs were presented as robots within the game world. One participant specifically associated the malfunctioning nature of the robots with an acceptance that their behaviour would not always appear completely natural. This supports the literature's argument that conversational systems should be evaluated in relation to the role and context established for the character rather than purely against an expectation of human-like communication.

The distinction between written and spoken interaction also became important when considering the HCI literature. Chapter 2 identifies spoken interaction as introducing additional considerations beyond written natural-language input, including speech recognition, privacy, player comfort, environmental context, and the social consequences of speaking aloud during play. The experiment reflected several of these concerns. One participant chose not to use spoken interaction because other people were present in the playtesting environment, while another described feeling awkward speaking aloud and modifying their speech to improve recognition.

These observations are consistent with the wider literature concerning voice interfaces. Research reviewed in Chapter 2 demonstrates that the apparent intuitiveness of speech does not necessarily mean that spoken interaction will be appropriate in every environment. Spoken communication takes place within a physical and social context, where the presence of other people, privacy, environmental noise, or personal preference can affect whether the interaction feels comfortable. Written NLI does not create these same requirements because the interaction can generally remain private between the player and the interface. The results from *Turing* therefore reinforce the value of considering written and spoken input as related but distinct forms of NLI rather than assuming that one provides a universally preferable interface.

This distinction also qualifies the structured findings concerning immersion. Twenty participants rated the combined use of written or spoken input as immersive, but because these methods were combined within the questionnaire item, the quantitative result cannot establish whether speech was more immersive than text or whether the two forms of interaction affected participants differently. The qualitative evidence instead suggests that the freedom to formulate personally selected language was itself an important contributor to immersion, regardless of whether that language was entered through writing or speech.

The results also connect with Cheng and Graham's work on free-form dialogue in RPGs (Cheng & Graham, 2019). Their *Persiflage* study demonstrates how unrestricted input can enable players to experiment with language, humour, unconventional approaches, and personally selected strategies. Similar behaviour occurred within *Turing*, where participants tested NPC responses and used conversational freedom to pursue information in individual ways. However, the automated nature of *Turing* introduces the technical constraint that Cheng and Graham's human-mediated system largely avoids. NPC responses depended on the capabilities, knowledge, and contextual information available to the implemented NLI system rather than on a human facilitator capable of interpreting almost any player contribution.

This provides a useful comparison with the scalability problem identified in Chapter 2. *Persiflage* demonstrates the expressive possibilities of unrestricted player input, but its reliance on human facilitators limits what it can establish about automated implementation. *Turing* demonstrates that comparatively open player input can be supported through an automated system, while also showing the resulting difficulties surrounding contextual knowledge, coherence, response quality, and game-state integration. The experiment therefore occupies a different position within the same design problem: increasing the freedom available to the player also increases the range of inputs and circumstances that the automated system must be capable of handling.

The findings further qualify Cheng and Graham's argument concerning agency. Eighteen participants reported that NPC interaction encouraged player freedom, suggesting that free-form dialogue supported considerable expressive autonomy within conversation. However, the less conclusive result concerning whether participants felt they were driving the wider narrative demonstrates that this freedom

should not automatically be interpreted as wider narrative agency. From an HCI perspective, the natural-language interface expanded the range of inputs available to the player, but the consequences produced by those inputs remained dependent on the surrounding game systems.

The experiment also identified a corresponding trade-off between freedom and interface guidance. Traditional dialogue menus restrict what the player can say, but they simultaneously communicate the available interaction space by displaying possible responses. NLI removes many of these visible restrictions, but doing so can also remove information concerning what the player is expected to ask, which NPC possesses particular knowledge, or which conversational pathways are available. One participant specifically identified this lack of guidance as frustrating, while another acknowledged that predetermined dialogue options may remain suitable for more tightly controlled narrative experiences. This suggests that menu-driven and natural-language interfaces offer different forms of usability rather than representing a simple progression from an inferior to a superior interaction model.

This interpretation is also consistent with the broader participant response concerning future game design. Twenty of the twenty-two participants regarded the NLI approach as a progression relative to traditional menu-driven or dialogue-tree systems, and all twenty-two considered it capable of opening new game-design possibilities. However, the qualitative findings did not indicate that participants expected NLI to replace established interfaces universally. Responses instead suggested possible applications across different genres and gameplay contexts while also recognising that suitability would depend upon the player, game design, and play environment.

In summary, the experiment broadly supports the HCI literature in positioning NLI as an interface whose value depends on both functional performance and the wider player experience. Participants generally perceived written or spoken NLI as intuitive and immersive, while the freedom to construct individual inputs encouraged exploration, personal expression, and experimentation with NPC behaviour. At the same time, the findings demonstrate that NLI introduces its own forms of friction through technical limitations, reduced interface guidance, player expectations, and the social circumstances associated particularly with spoken input. The results therefore suggest that NLI expands the range of interaction methods available within narrative games rather than providing a universal replacement for existing interfaces.

Its effectiveness depends on the relationship between player freedom, system capability, narrative framing, contextual knowledge, and the environment in which interaction takes place.

7.5 Revisiting the Research Questions

This section revisits the research questions set out in Chapter 1, reflecting on how each has been addressed through the experimental study and data analysis. The study set out to examine the player experience of NLI in RPGs, with particular focus on player engagement, narrative agency, NPC interaction, realism, immersion, and interaction quality. Each question is reconsidered in light of the findings presented in Chapter 6 and the discussion of those findings in relation to the literature.

Research Question 1:

How do players perceive and engage with an NLI-driven RPG, and what factors influence their enjoyment, interest, and willingness to recommend such a design?

The first research question sought to understand how players perceived and engaged with an NLI-driven RPG, with particular emphasis on enjoyment, interest, and willingness to recommend similar designs. The results indicate a consistently positive response within the participant sample. Twenty of the twenty-two participants provided predominantly positive first impressions, while all twenty-two stated that they would like to see more games using a similar design approach. All participants also expressed either very or somewhat positive interest in playing a released game of this kind and indicated that they would be very or somewhat likely to recommend similar games to a friend. Each of these three directional distributions differed from an equal positive and negative response split, $p < .001$.

The qualitative findings provide further explanation for this interest. Participants frequently valued the ability to construct their own questions and responses rather than selecting from predefined dialogue options. This conversational freedom encouraged experimentation, exploration, and curiosity, allowing players to decide what information they wanted to pursue and how they wanted to approach individual NPCs. Conversations were therefore associated not only with expression, but also with discovering quests, investigating the world, and uncovering narrative information.

NPC responsiveness also influenced enjoyment and engagement. Participants described interest in seeing how characters would react to unexpected questions,

different forms of phrasing, and attempts to test the limits of the system. Character personality, contextual information, and responses that were not entirely predictable contributed to perceptions that the NPCs were engaging and believable. However, this did not mean that participant interest was based on conversational technology alone. Responses frequently connected NLI with wider aspects of game design, including puzzles, exploration, worldbuilding, characterisation, quests, and narrative discovery.

The findings also identified factors that could reduce enjoyment. Delayed responses, repetitive or overly lengthy dialogue, occasional misunderstandings, limited NPC knowledge, and interface-related interruptions could disrupt conversational flow. These limitations demonstrate that player engagement depended not only on the freedom offered by natural-language input, but also on the speed, clarity, responsiveness, and wider game structures supporting that interaction.

In summary, participants generally perceived the NLI-driven RPG positively and expressed consistent interest in experiencing and recommending similar designs. Enjoyment and engagement were influenced by conversational freedom, responsive and distinctive NPCs, opportunities for exploration and narrative discovery, and the integration of NLI with wider gameplay and narrative systems. The findings therefore suggest that NLI was most positively received when it contributed to the wider game experience rather than functioning as an isolated interaction feature.

Research Question 2:
How do NPC interactions driven by natural language systems influence player perceptions of narrative agency, realism, and freedom in role-playing games?

The second research question explored how natural-language-driven NPC interaction influenced perceptions of narrative agency, realism, and freedom. The findings demonstrate an important distinction between conversational freedom and control over the wider narrative.

Eighteen of the twenty-two participants reported that NPC interaction encouraged player freedom, producing a distribution that differed from an equal positive and negative response split, $p = .004$. By comparison, sixteen participants felt that the narrative was being driven by them to at least some extent. Although this represents a majority of the sample, the distribution did not meet the established threshold for statistical significance, $p = .052$. The results therefore provide stronger evidence that

NLI supported freedom within conversation than that it consistently produced a wider sense of narrative control.

The qualitative findings reinforce this distinction. Participants valued being able to formulate their own questions, communicate creatively, investigate information, and determine how conversations developed. However, some also identified limits when attempting to influence events beyond the immediate exchange or expressed interest in seeing conversations produce clearer consequences elsewhere in the game. This suggests that expressive freedom within dialogue does not automatically become narrative agency unless conversational choices are connected to wider changes in game state or narrative outcomes.

Perceptions of realism were also generally positive. Eighteen participants rated the NPCs towards the realistic end of the scale, $p = .004$, while seventeen rated the NPCs positively in relation to acting and perceiving their environment naturally, $p = .017$. Seventeen participants also considered the interactions closer to real-life conversation than NPC interaction in other games, $p = .017$. However, the qualitative findings indicate that realism was not judged solely according to human imitation. Participants also considered whether NPC behaviour was appropriate to the narrative setting, character role, surrounding environment, and current game state.

This was particularly apparent in responses concerning the robotic characters. Several participants explained that behaviours which might have appeared unnatural for human characters remained believable because they were consistent with the role of robots within the setting. Contextual responsiveness and situational awareness further influenced these evaluations. Participants responded positively when NPCs recognised collected items, nearby characters, or changes in gameplay, while failures to acknowledge relevant events or information exposed the limitations of the system.

In summary, NLI-driven NPC interaction supported perceptions of expressive freedom and generally positive evaluations of NPC realism, but its influence on wider narrative agency was less conclusive. The findings indicate that conversational freedom is most likely to contribute to narrative agency when dialogue is connected with meaningful consequences elsewhere in the game. NPC realism was similarly dependent on more than linguistic fluency, with narrative framing, contextual

knowledge, situational awareness, and consistency with the character's role all contributing to believability.

Research Question 3:

How do players evaluate the effectiveness and realism of NLI systems in video game environments, particularly in comparison to virtual assistants and other NLI-integrated games?

The third research question focused on participant evaluation of NLI effectiveness and realism within a video game environment, while also considering previous experience with virtual assistants and other games using NLI.

The quantitative findings indicate a consistently positive evaluation of the implemented system. All twenty-two participants rated the translation of the NLI approach into the video game environment as either very or somewhat successful, $p < .001$. Twenty-one participants rated NPC understanding positively, also $p < .001$, while twenty rated the NPC interactions towards the realistic end of the scale, $p < .001$. Supporting descriptive evidence also showed that twenty participants found the NPCs engaging.

Previous experience provides useful context for these results, but the comparisons require qualification. Twenty-one participants had previously used a virtual assistant, while eleven reported previous experience of a game that allowed written or spoken NLI. However, familiarity with virtual assistants should not be interpreted as evidence that participants directly evaluated *Turing* against systems such as Alexa or Siri. Only one participant explicitly compared the experimental game with Siri, while considerably more direct comparison occurred with previous games and game-related systems.

Among participants with relevant previous gaming experience, *Turing* was commonly distinguished from earlier implementations through the breadth and flexibility of language that could be used. Previous systems were described as relying on keywords, prescribed commands, single-word inputs, or relatively restricted forms of language recognition. By comparison, participants described being able to ask NPCs for clarification, request further explanation, use different forms of phrasing, and engage in more developed conversational exchanges.

Effectiveness was therefore judged through more than successful recognition of player input. Participants also considered whether the system could maintain a conversation, provide useful information, respond naturally, and draw upon appropriate contextual knowledge. Occasional misunderstandings remained present, but participants could still evaluate the system positively overall where communication was able to continue. Conversely, an NPC could understand a question correctly while still producing an unsatisfactory response if it lacked the knowledge required to respond appropriately.

In summary, participants generally evaluated the NLI implementation positively in relation to effectiveness, understanding, and conversational realism. Those with relevant previous experience commonly perceived *Turing* as providing broader and more flexible interaction than more restricted game-based NLI systems. However, the study provides only limited evidence of direct comparison with commercial virtual assistants. The findings instead suggest that effectiveness in game-based NLI depends on a combination of language understanding, conversational flexibility, response quality, contextual knowledge, and the possibilities that those capabilities provide within the wider game.

Research Question 4:

How does the use of NLI systems, supported by written or spoken input, influence player immersion, intuitiveness, and observations of innovation in video game design?

The final research question explored how written or spoken natural-language input influenced immersion, intuitiveness, and participant observations concerning new approaches to video game interaction and design.

The quantitative findings were consistently positive. Twenty of the twenty-two participants rated written or spoken NLI towards the immersive end of the scale, $p < .001$. All twenty-two rated the interaction as either very or somewhat intuitive, also $p < .001$. Twenty participants characterised the approach as a progression relative to traditional menu-driven and dialogue-tree systems, $p < .001$, while all twenty-two believed that the implementation opened new possibilities for game design, $p < .001$.

The qualitative findings suggest that immersion was influenced particularly by the opportunity to formulate personally selected language. Participants valued being able to control their wording, tone, questions, and intended meaning rather than

selecting from predefined options. This increased the sense of personal expression within NPC interaction and was frequently associated with a more involved and immersive experience. However, because the structured questionnaire measure combined written and spoken input, the quantitative findings do not establish that one input method was more immersive than the other.

Similarly, the unanimous positive evaluation of intuitiveness did not mean that interaction was entirely frictionless. Spoken input introduced practical and social considerations that were not shared by written interaction. One participant chose not to speak because other people were present, while another described feeling awkward speaking aloud and consciously changing their speech to improve recognition. These findings distinguish the conceptual familiarity of natural-language communication from its practical suitability within a particular play environment.

Greater freedom also produced a trade-off with interface guidance. Removing predefined dialogue choices allowed players to determine what they wanted to say, but it could also make it less clear which information was available, what questions should be asked, or which NPC should be approached. The findings therefore do not indicate that NLI should universally replace conventional dialogue interfaces. Instead, they suggest that different interaction systems provide different advantages depending on the intended game design, player preferences, and circumstances of play.

Participant responses concerning progression and new design possibilities provide evidence of how the interaction approach was perceived within the sample. These findings should not be treated as objective proof that the system was innovative in itself, but they demonstrate that participants recognised possibilities beyond established menu-driven or dialogue-tree interaction. Suggested applications extended beyond the experimental RPG and included other genres, NPC roles, tutorial approaches, and forms of gameplay communication.

In summary, written or spoken NLI was generally perceived as immersive and intuitive, while participants also regarded the approach as capable of supporting new forms of game interaction. These benefits were associated particularly with personal expression and conversational freedom. However, the findings also identify practical and social friction surrounding spoken input and a trade-off between conversational freedom and the guidance supplied by conventional interfaces. NLI can therefore be

understood as expanding the range of interaction approaches available to game designers rather than replacing existing methods in every context.

7.6 Revisiting the Aims and Objectives

In addition to addressing the specific research questions, the study was guided by a broader set of aims and objectives focused on understanding how NLI systems can support narrative design in RPGs. The findings of the experimental study indicate that these aims and objectives were substantially addressed through the design, implementation, and evaluation of *Turing*, while also identifying important qualifications concerning narrative agency, contextual responsiveness, and the wider integration of NLI with game systems.

The primary aim was to investigate how NLI systems can support narrative design in RPGs, with a focus on player experience, immersion, and the extent to which conversational interaction can contribute to dynamic and adaptive narrative experiences. The study addressed this aim by allowing participants to interact directly with an NLI-driven RPG and evaluating their responses through both qualitative and quantitative data. Participants frequently associated natural-language dialogue with personal expression, conversational freedom, exploration, and immersion. However, the findings also demonstrated that freedom within conversation did not automatically result in control over the wider narrative. The study therefore provides stronger evidence for NLI supporting flexible and responsive narrative interaction than for complete co-creation of dynamic narrative outcomes.

The first objective was to explore player perceptions of NLI-driven RPGs. This was addressed through detailed participant feedback concerning enjoyment, interest, engagement, and willingness to recommend similar designs. All twenty-two participants stated that they would like to see more games using a similar approach, expressed positive interest in playing comparable games, and indicated that they would be likely to recommend similar games to others. The qualitative findings further identified conversational freedom, responsive NPCs, exploration, worldbuilding, puzzles, and narrative discovery as factors contributing to this interest. At the same time, technical delays, repetition, and interaction friction demonstrated that positive perception remained dependent on the quality of the wider implementation.

The second objective was to evaluate the impact of NLI-enabled NPC interactions on perceptions of narrative agency, realism, and freedom. This objective was also addressed, although the findings revealed differences between these areas. Participants generally perceived NPC interaction as encouraging freedom, with eighteen of the twenty-two responding positively to this measure. Perceptions of wider narrative agency were less conclusive, with sixteen participants reporting that the narrative was being driven by them to at least some extent and the resulting distribution falling narrowly outside the established threshold for statistical significance. NPC realism was evaluated more positively, while the qualitative findings demonstrated that believability was shaped by narrative framing, contextual knowledge, situational awareness, and consistency with the character's role. The objective therefore identified both the opportunities and limitations of NLI-driven NPC interaction rather than producing a uniform effect across agency, realism, and freedom.

The third objective was to compare NLI systems in games to other applications. This was addressed through participant measures of previous experience and through comparative observations within the questionnaire. Twenty-one participants had previously used a virtual assistant, while eleven had previous experience of games that allowed written or spoken NLI. However, the findings provide stronger direct comparison with previous game-based systems than with commercial virtual assistants. Only one participant explicitly compared *Turing* with Siri, whereas participants with relevant gaming experience described earlier implementations based on keywords, prescribed commands, restricted phrases, or limited language recognition. These comparisons frequently positioned *Turing* as allowing broader and more flexible interaction. The objective was therefore addressed most clearly through comparisons with previous NLI implementations in games, while virtual-assistant familiarity provided useful contextual evidence rather than a systematic comparative benchmark.

The fourth objective was to design and develop a prototype game and was fulfilled through the creation and evaluation of *Turing*. The prototype integrated modern NLI systems within an RPG environment and supported interaction with NPCs through both written and spoken natural-language input. This provided the practical testing environment through which the research questions could be investigated and enabled participants to evaluate NLI through direct gameplay rather than

hypothetical reflection. The prototype subsequently generated the qualitative and quantitative dataset used throughout the analysis and discussion.

The final objective was to analyse the role of NLI in player immersion and innovation. This was addressed through participant ratings and open-text responses concerning immersion, intuitiveness, progression from established interaction systems, and new possibilities for game design. Twenty of the twenty-two participants rated written or spoken NLI as immersive, all twenty-two considered the interaction at least somewhat intuitive, twenty regarded the approach as a progression relative to traditional menu-driven or dialogue-tree systems, and all twenty-two believed that the implementation opened new possibilities for game design. The qualitative findings associated these evaluations particularly with personal expression and conversational freedom, while also identifying practical and social friction surrounding spoken input and a trade-off between freedom and the guidance offered by conventional dialogue systems.

These results demonstrate that participants perceived NLI as offering new possibilities for video game interaction, but this should be distinguished from establishing the technology as objectively innovative or universally preferable to existing systems. Participant responses instead suggest that NLI can expand the interaction approaches available to designers, with its suitability dependent on factors including game design, player preference, contextual knowledge, interface guidance, and the environment in which play takes place.

In summary, the research aims and objectives were substantially addressed through the combined design and evaluation of the NLI-driven RPG prototype. The study provides evidence that natural-language systems can support conversational freedom, personal expression, immersion, responsive NPC interaction, and new approaches to narrative and gameplay interaction. At the same time, the findings refine the original aims by demonstrating that broader narrative agency and co-creation depend on how conversational interaction is connected with game-state awareness, narrative consequence, and wider design systems. Rather than NLI capability alone determining the player experience, its value within *Turing* was shaped by how effectively it was integrated into the wider game.

7.7 Contributions to Knowledge

This study makes four related contributions to knowledge across theoretical, methodological, empirical, and practical areas of narrative game design, NLI, and HCI. These contributions emerged through the progression of the research rather than from the experimental results alone. Chapter 2 identified limitations and opportunities within existing research, Chapter 3 examined these issues through a pilot study of player experiences and expectations, Chapters 4 and 5 translated these findings into an evaluation methodology and playable prototype, and Chapter 6 provided the participant evidence through which the research questions could be evaluated. The following contributions bring together the evidence developed across these stages.

Theoretical Contribution

The theoretical contribution concerns the relationship between NLI, NPC design, and player-driven narrative within RPGs. Chapter 2 established this contribution by examining existing research into emergent narrative, player agency, NPC believability, conversational interaction, and the limitations of restricted or pre-scripted dialogue systems. Chapter 3 provided further justification through participant responses that identified NPCs as important to narrative delivery while also highlighting limitations associated with scripted or shallow forms of interaction.

These findings drove the investigation into whether contemporary NLI could provide greater conversational flexibility while remaining integrated with an authored game world and narrative structure. Chapter 5 translated this into the design of *Turing*, where NPCs were given distinct narrative roles, contextual knowledge, and the ability to respond to free-form player input. The resulting participant evidence in Chapter 6 showed that players associated this interaction with increased conversational freedom, realism, immersion, and engagement, while perceptions of wider narrative agency were more qualified. Chapter 7.4 subsequently situated these findings against the literature reviewed earlier in the thesis.

The theoretical contribution is therefore an evidence-based account of how free-form NLI can support player perceptions of NPCs as more responsive narrative agents within an RPG. Rather than replacing authored narrative structures, the findings indicate that NLI can operate within them to provide players with greater freedom over how narrative information is explored and how interactions with NPCs unfold.

The findings further distinguish this conversational freedom from wider narrative agency, indicating that broader player influence depends on how dialogue is connected with game-state changes and narrative consequence.

Methodological Contribution

The methodological contribution is the design and evaluation of a functioning RPG prototype through which contemporary NLI could be examined as part of a complete gameplay experience. This contribution was driven by the limitations identified in Chapter 2 concerning earlier or more restricted implementations of NLI, together with the pilot study findings in Chapter 3 that demonstrated limited participant exposure to contemporary written or spoken NPC interaction.

Chapter 4 established the mixed-methods evaluation used to investigate player responses, including the recruitment process, testing conditions, questionnaire structure, and complementary qualitative and quantitative approaches. Open-text responses were analysed using reflexive thematic analysis, while structured responses were examined through frequencies and percentages alongside selected exact inferential tests where these directly contributed to the research questions. Chapter 5 then documented the development of *Turing* and, importantly, demonstrated how findings from the literature review and pilot study were converted into practical design requirements.

The methodological contribution is therefore a documented approach to designing and evaluating free-form NLI within a playable narrative RPG. By connecting theoretical findings, preliminary participant research, prototype development, and mixed-methods evaluation, the study provides an approach that can be reproduced, adapted, or extended by subsequent research into player-NPC interaction and interactive narrative systems.

Empirical Contribution

The empirical contribution is a body of participant evidence concerning how players perceive and evaluate free-form NLI when it is integrated into a narrative RPG. This contribution was driven by the limited contemporary player-experience evidence identified in Chapter 2 and by the preliminary findings of Chapter 3, which demonstrated both player interest in more responsive NPC interaction and limited exposure to modern NLI systems within games.

The evaluation methodology described in Chapter 4 was used to investigate these issues through the *Turing* prototype. Chapter 6 presents the resulting quantitative and qualitative data concerning enjoyment, immersion, narrative agency, realism, conversational freedom, intuitiveness, engagement, and perceptions of innovation. It also records limitations identified by participants, including response delays, conversational misunderstandings, situational awareness, and the depth of some NPC responses.

Chapter 7 subsequently interprets these findings against the pilot study, literature review, research questions, and aims and objectives. For example, participants generally considered the NLI interaction immersive and intuitive, while previous experience with virtual assistants provided contextual information concerning participant familiarity with conversational systems, while more direct comparisons were made with previous game-based implementations of NLI. Written or spoken NLI was also positively received in relation to immersion and freedom of expression, although the combined questionnaire measure does not establish whether one input method was more immersive than the other.

The empirical contribution is therefore contemporary player-experience evidence concerning the use of free-form NLI within the specific context of a narrative RPG. The data provides insight into both the perceived benefits of this approach and the limitations that remain when NLI is incorporated into a playable game environment.

Practical Contribution

The practical contribution concerns the design considerations that emerged through the development and evaluation of *Turing*. This contribution was initially driven by the requirements identified through Chapters 2 and 3, including the importance of NPCs to narrative delivery, the desire for greater conversational freedom and realism, and the need to balance responsive interaction with narrative coherence.

Chapter 5 demonstrates how these requirements were addressed within the prototype. The development process considered areas including NPC characterisation, contextual knowledge, conversational history, information delivery, spoken and written input, player feedback, interface design, and the relationship between NLI and existing gameplay systems. This provided practical experience of the design and technical considerations involved in integrating NLI into a narrative RPG.

Chapter 6 then provided evidence concerning the effectiveness and limitations of these decisions. Participants responded positively to conversational freedom, responsiveness, immersion, and the ability to influence how interactions developed, while also identifying areas requiring further development. These included response times, situational awareness, conversational depth, ambiguity, and the ability to obtain specific information from NPCs. The combination of successful and unsuccessful aspects of the prototype is important to this contribution, as it identifies not only what supported the player experience but also where the implementation created difficulties.

The practical contribution is therefore a set of evidence-informed design considerations for researchers and developers investigating NLI-enabled narrative systems. These findings indicate the importance of balancing conversational freedom with contextual control, maintaining sufficient NPC knowledge and narrative coherence, managing player expectations, and ensuring that the technical implementation remains responsive enough to support the intended player experience. These considerations also inform the recommendations for continued research presented in Section 7.8.

In summary, these contributions reflect the progression of the thesis from identifying a research problem to designing, implementing, and evaluating a practical response. Chapters 2 and 3 establish what drives the research, Chapters 4 and 5 demonstrate how these findings were translated into an evaluable methodology and prototype, Chapter 6 provides the principal empirical evidence, and Chapter 7 situates the resulting findings within existing knowledge. The contribution of the thesis therefore lies not in NLI technology alone, but in demonstrating and evaluating how contemporary natural language systems can be incorporated into narrative RPG design to support more flexible forms of player-NPC interaction.

7.8 Recommendations for Future Research

While this thesis provides evidence concerning the integration of NLI systems within RPG narrative design, it also identifies several areas where further research would be valuable. As natural-language technologies and interactive narrative systems continue to develop, future studies could expand, refine, and challenge the findings presented here through a number of related directions.

Firstly, future research could investigate how conversational freedom can be connected more directly with wider narrative consequence. The present study found stronger evidence for freedom within conversation than for control over the broader narrative, suggesting that the ability to decide what to say does not automatically produce greater narrative agency. Future prototypes could therefore connect conversational choices more extensively with game-state changes, relationships, quest outcomes, environmental responses, and longer-term narrative developments. This would provide a clearer basis for examining when conversational agency develops into wider narrative agency.

A related area concerns the development of more sophisticated NPC memory and contextual-awareness systems. *Turing* implemented a memory model to support conversational continuity and selected game-state responsiveness, but participants also identified occasions where NPCs lacked relevant information or failed to acknowledge changes within the surrounding environment. Future research could investigate systems that track previous conversations, completed actions, evolving relationships, emotional responses, and changing world states over longer periods. This would allow closer examination of how memory, situational awareness, and contextual knowledge influence NPC believability and narrative engagement.

The duration of player interaction also warrants further investigation. Participants in the present study interacted with the prototype for a controlled thirty-minute period before completing the questionnaire. This was appropriate for providing consistent experimental conditions, but longer or repeated play sessions would allow future research to examine qualities that cannot be fully evaluated within a short encounter. These could include persistent memory, changing player-NPC relationships, repeated interaction with the same characters, longer-term narrative consequence, and whether conversational systems remain engaging once their capabilities and limitations become more familiar.

Future studies would also benefit from broader participant populations. The current sample was drawn from an academic games environment and included students and lecturers, meaning that the findings should not be treated as representative of video game players more generally. Subsequent research could involve participants from a wider range of gaming backgrounds, ages, levels of technical familiarity, and experience with narrative games or conversational technologies. This would help

determine whether the patterns identified in the present study remain consistent across different player groups.

The prototype developed in this study also operated within a comparatively controlled game environment with a limited number of NPCs. Future research could examine the challenges associated with scaling NLI systems to larger worlds containing more numerous, varied, and interdependent characters. Such work would need to consider contextual coherence, information management, computational requirements, consistency between NPCs, and the difficulty of maintaining meaningful interactions as the number of possible conversational and game-state combinations increases.

Written and spoken input also require more direct comparative investigation. The present study allowed participants to use both approaches, but the principal questionnaire measures concerning immersion and intuitiveness considered them together. The findings therefore cannot establish whether one mode produced stronger immersion or usability than the other. Future experiments could compare written and spoken NLI under controlled conditions, examining differences in immersion, intuitiveness, interaction speed, error rates, player preference, and conversational behaviour. Such work could also investigate accessibility specifically, as this was not directly measured within the present study.

This comparison would be particularly valuable because the qualitative findings identified practical and social considerations associated specifically with spoken interaction. One participant chose not to speak because other people were present, while another described feeling awkward and modifying their speech to improve recognition. Future work could therefore examine how factors such as privacy, environmental noise, social setting, disability, player confidence, and personal preference influence the suitability of speech and text across different gameplay contexts.

Another avenue for future research concerns the relationship between conversational freedom and interface guidance. Participants valued being able to determine their own questions, but the removal of predefined dialogue options could also make it less clear what information was available, what should be asked, or which character possessed relevant knowledge. Future prototypes could investigate hybrid interaction approaches that retain free-form NLI while introducing optional

prompts, contextual cues, conversation histories, suggested topics, or other forms of guidance. This could help determine how designers might preserve expressive freedom without removing the signposting traditionally provided by dialogue menus.

Another important area for research is the localisation of NLI systems across different languages and cultural contexts. The present study was conducted through English-language interaction, and the performance and perception of conversational systems may differ when applied to other languages. Future work could investigate multilingual dialogue, translation, culturally specific forms of communication, and the ways in which characterisation or conversational nuance may change across languages.

Further research could also explore combining NLI with procedural and adaptive game systems. The present findings suggest that conversational flexibility becomes more meaningful when it is connected with wider gameplay and narrative structures. Integrating NLI with systems capable of generating or modifying quests, relationships, character states, environmental conditions, or narrative events could therefore provide a useful means of examining more extensive forms of player-driven narrative. Such research would also need to investigate how greater systemic flexibility can be balanced with coherence and authorial control.

The role of genre also warrants further examination. This study focused on an RPG context, where character interaction, narrative discovery, and player expression form central parts of the experience. However, participants themselves proposed applications extending into other genres and gameplay situations. Future research could investigate how NLI functions within horror, strategy, simulation, racing, tactical, or other forms of game design, and whether different genre conventions alter player expectations concerning responsiveness, realism, conversational freedom, or the appropriate role of NPC interaction.

Finally, future studies should revisit these findings as natural-language technologies continue to develop. Improvements in language understanding, response speed, contextual memory, speech recognition, and integration with game-state systems may change both what designers are able to implement and what players expect from conversational NPCs. Continued research should therefore focus not only on technological capability, but on how those capabilities alter player behaviour,

narrative design, interaction expectations, and the relationship between conversational freedom and wider gameplay systems.

Taken together, these directions extend directly from the limitations and opportunities identified through the present study. Future research would benefit from examining NLI over longer periods, with broader participant groups, more developed game-state integration, and clearer comparisons between input methods. Such work could provide a more detailed understanding of when NLI contributes most effectively to narrative agency, NPC believability, player immersion, and wider game design.

7.9 Concluding Remarks

In closing, this thesis set out to investigate how NLI systems can support narrative design in RPGs, with a particular focus on player engagement, immersion, conversational freedom, NPC interaction, and narrative agency. In response to limitations identified within existing research and established approaches to game dialogue, the study explored how contemporary natural-language systems could allow players to interact with NPCs through free-form written or spoken input while remaining situated within an authored game world.

The development and evaluation of the prototype game *Turing* provided a practical means of investigating these questions through direct player experience. The findings demonstrate that participants generally responded positively to NLI, particularly where conversational freedom supported exploration, personal expression, worldbuilding, character interaction, puzzles, and narrative discovery. Participants also evaluated the interaction positively in relation to immersion, intuitiveness, NPC understanding, realism, and the possibilities it created for alternative approaches to game interaction.

At the same time, the research identified important limits to these outcomes. Conversational freedom did not automatically result in wider narrative agency, demonstrating that the ability to determine what is said must be distinguished from the ability to influence broader narrative events. NPC believability also depended on more than language generation, with contextual knowledge, situational awareness, narrative framing, response quality, and game-state responsiveness all contributing to the player experience. Similarly, written and spoken interaction introduced different practical considerations, while the removal of predetermined dialogue

choices created a trade-off between greater expressive freedom and reduced interface guidance.

These findings position NLI not as a universal replacement for established dialogue systems, but as an additional approach through which narrative interaction can be designed. Its value depends on how effectively conversational capability is connected with characterisation, NPC knowledge, game-state awareness, gameplay systems, narrative consequence, and the wider context in which play occurs. The study therefore contributes theoretical, methodological, empirical, and practical knowledge concerning how contemporary natural-language systems can be incorporated into narrative RPG design and evaluated through player experience.

As natural-language technologies continue to develop, the opportunities available to narrative designers are also likely to change. The findings of this thesis provide a basis from which those developments can be investigated further, particularly through longer-term interaction, more extensive narrative consequence, broader participant populations, and increasingly connected game systems. Rather than providing a final model for NLI-driven narrative design, the research demonstrates both the possibilities of conversational interaction and the design challenges that must be addressed if those possibilities are to extend meaningfully into wider game experiences.

This Has Been My Hero's Journey…

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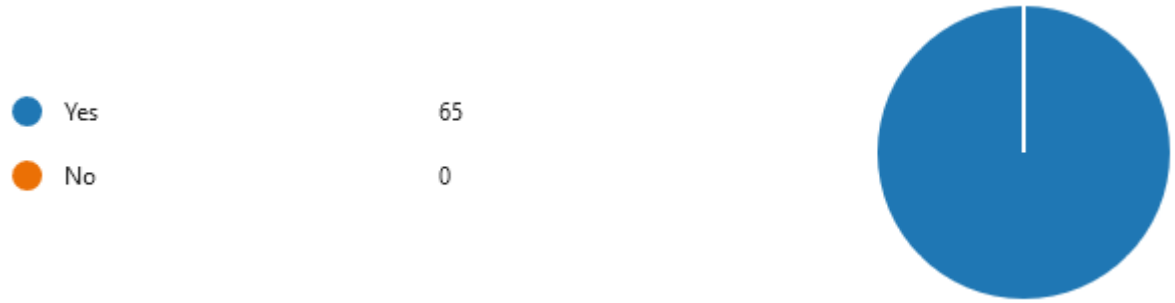
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Appendix

1. Pilot Study Results Data

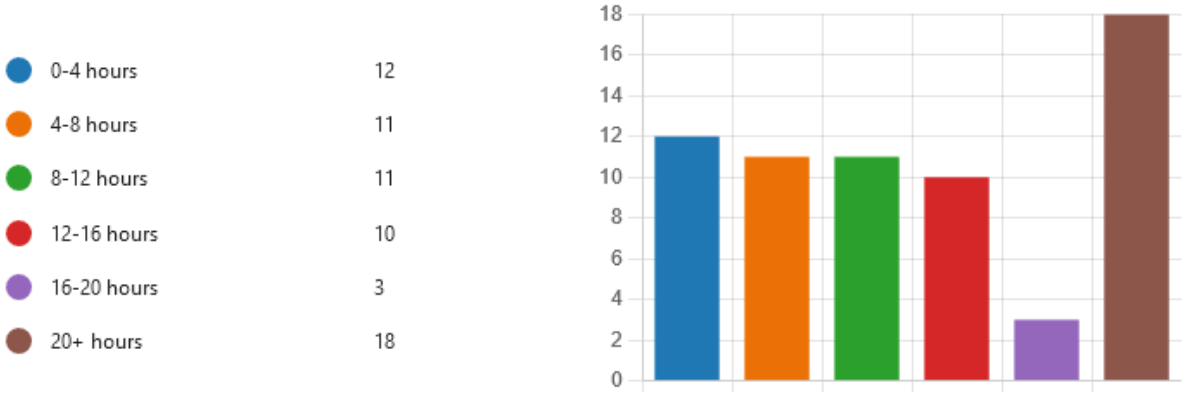
A. Section 01: Preliminary Questions

1. Do you play video games?



(Figure 3.01)

2. If yes, how often do you play per week?



(Figure 3.02)

3. List the game genres you mostly play.

1	Action
2	RPG, FPS, Adventure, Action, Superhero, Strategy
3	RPG, puzzle
4	Action, adventure, fantasy, RPG
5	Strategy, RPG's, simulation and action adventures.
6	First or Third Person Shooters
7	Action-Adventure/Narrative Driven Games/ RPGs
8	RPGs, Exploration Games, Puzzle Games (tho I suck at them)
9	RPG, Metroidvania, Strategy
10	Adventure, RPG

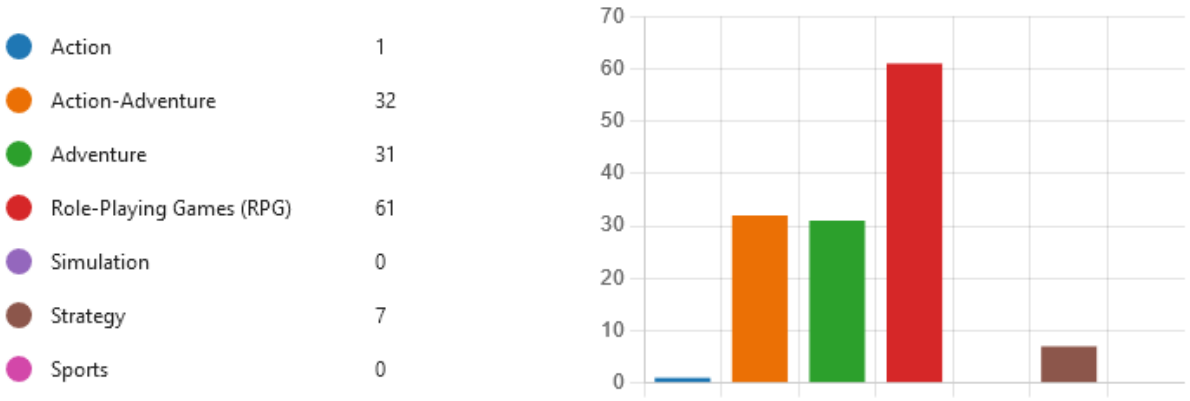
11	Sports, Adventure, Sci Fi, Horror, Shooter
12	Strategy, Action, FPS, Adventure
13	Action adventure, RPG, FPS
14	Roleplaying Games
15	Racing, FPS, RPG
16	FPS/TPS, RTS, TBS
17	1st person shooter. Racing. Third person puzzle and shooter. Strategy games.
18	MMORPG/MOBA/RPG
19	JRPG'S, Action Adventure games and RPG'S in general.
20	Action adventure, RPG, simulation, puzzle, strategy
21	Role-playing games
22	MOBA, RPG
23	FPS (apex legengs, csgo), ARPG(diablo 3), rouge-like (Realm of the mad god)
24	Breath of the wild, Pokémon (various), cuphead, dragon age inquisition, Witcher 3, JoJo's bizarre adventure: eyes of heaven
25	RPGs, fighting games. Board games.
26	Digital card games and first person shooter
27	Strategy, RPG
28	RPG, Adventure, Strategy, Puzzle, Action Adventure
29	Fps, strategy /factory, Sandbox, rpg
30	Sandbox, survival, simulation, visual Novel
31	Any
32	Strategy and Shooters
33	Story driven, shooters, casual mobile, horror
34	Platformer, puzzle, action RPG
35	Single player rpgs
36	Mystery adventure
37	mmorpg, third ps, fps
38	RPG, mobile, indie
39	RPG, FPS, ADVENTURE, FIGHTING, RACING
40	rpg, metroidvania, interactive fiction
41	MOBAs, FPS/Team-based hero shooters

42	Roguelikes, visual novels
43	Role Playing Games
44	Puzzle, platformer, third person adventure
45	RPG
46	MMO, Roguelike, RPG
47	RPG, FPS, 3rd Person Shooters
48	Platform, Story, Open World, RPG, dungeon games
49	Action, RPG
50	MMORPG, FPS, RPG, RTS, Racing
51	Loot shooter, FPS, RPG, MMO
52	mmorpg, rpg, open world, sandbox, survival, action-adventure, first-person shooter
53	Puzzle, Adventure, Platformer, Action-RPG, JRPG, Action-Platform, Action-Adventure, Puzzle-Platformer, Adventure-Platformer, Puzzle-Adventurer
54	FPS, RTS, MMO, Co-op, Action, Adventure, Stealth
55	Action Adventure, Fighting, Strategy, RPG
56	RPG
57	Action, adventure, rpg
58	Platformers, Puzzle games
59	MOBA, RPG, Strategy/RTS, sometimes FPS
60	FPS, Adventure, Action, Puzzle
61	Rpg, fps, 4x, strategy, minecraft(survival/crafting?)
62	Sandbox, Creation
63	fps, strategy, rpg
64	Borderlands, League of Legends, Stardew Valley
65	Sandbox, Simulators, Strategy, RPG

(Figure 3.03)

B. Section 02: Game Design Questions

1. Which of the following game genres do you consider have the most complete storylines?



(Figure 3.04)

2. What game mechanics do you think help a player to advance a narrative?

1	Metroidvanian
2	Quests
3	Whatever gameplay is required, dialogue
4	Well-written characters
5	Character customisation and progression.
6	interactions
7	Exploration of environment
8	Interrogation and Persuasion mechanics allow players to explore the narrative through the different lenses of the characters
9	Narrative decisions, NPC interactions, player freedom
10	Movement
11	Option to select dialogue and make choices, similar to Until Dawn
12	Dependent to the overall theme and design of the game. No game mechanic will help advance a narrative, only the point of which the player has progressed to ALONGSIDE the mechanic.
13	The player having access to to do more as the game mirrors the progress of the game character which makes them feel more conected to the character and therefore the game
14	Questing systems in RPGs are a simple yet effective mechanic that lets players choose what they want to do and an even have the player decide how something might end, creating unique narratives to different players in a way.
15	Combat and dialogue
16	Skills and levelling to show character progression and advancement
17	I am unsure.

18	World evolution based on character choices
19	Cutscenes and story telling through the world
20	NPC interaction
21	Interesting npcs
22	when the decisions you make during the game are affecting the storyline
23	Interactive NPC's.
24	Dialogue choice
25	Multiple choice. Branching dialog.
26	I think almost any game mechanic could be used to advance a narrative
27	having a skip or close dialog button I read hella fast.
28	Response, clear direction and information.
29	Npc interaction
30	Clear immediate goals, clear overall motivation, chaptering or visual progression
31	choices which affect the story, or at least feel like they do
32	Cutscenes, Dailogue, NPCs, Environmental Storytelling,
33	Linear environments, locked doors
34	Not sure what this means
35	Character customization, especially the option to play as a man or woman. I find RPGS with male only player charscter don't hold my attention that much because I cannot pretend that it's really me in game. Along with that customization, NPCs should also adjust to your customization. (For insurance maybe that NPC elf won't talk to you if you're human, but will speak to you if you are also an elf.)
36	Having a semi-clear objective to complete
37	walking
38	When choices of the character have in-game consequences
39	Dialogue options. Interactive story elements.
40	choices that affect the plot, interactivity, a game that "remembers" choices
41	loot progression
42	????
43	Quests, Goals, problem solving
44	I don't know what a game mechanic is.
45	dialogue

46	Questing, exploration, NPC interactions
47	Npc communication
48	Choice
49	Reactivity to the player's decisions and character stats.
50	Questing
51	Branching dialogue with tangible gameplay consequences.
52	Quests
53	Signposting, Quests, Finding Keys for the Locked Door
54	Well... Everything a player does in the story advances the narrative? But, giving them choices that have meaningful effects?
55	Support Conversations (See: Fire Emblem) They help develop the characters, and sometimes even flesh out parts of the world for the player.
56	Compelling characters with interesting backstories and motivations, a rich story that has mysterious elements that keep you wanting to find out what happens next
57	Dialog options
58	In game cutscenes to not break immersion
59	Dialogue, completing levels/quests/objectives
60	NPC characters and side quests often help flesh out a world
61	Battles? Cutscenes?
62	The ability to customize your character, dialogue systems, and making a meaningful impact to the world.
63	quest, dialogs, cutscenes
64	Optional Text, hidden story the player needs to find
65	If included, large variety of branching storylines based on the player's choices. Player to NPC speech is also a great factor.

(Figure 3.05)

3. For storytelling within a game, what do you believe functions as an important narrative device?

1	Npc dialogue
2	Dialogue
3	Subtle details in decor, music
4	Good characters

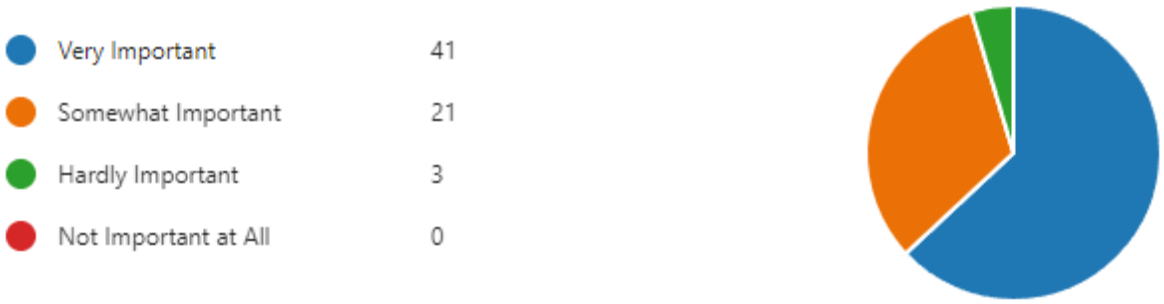
5	Immersive gameplay, such as seemless cutscenes and few loading screens.
6	Yes
7	Companion as they will provide dialogue with the main protagonist
8	That's a bit of a large question. There are literally hundreds of different devices that are key to any story. As for the most important narrative device, I believe a game's atmosphere is most important, as it adds a general backdrop that players build on when attempting to interpret the story.
9	Environmental storytelling, thematic design, NPC interactions
10	The mechanics - how I progress through the game, how I can treat NPCs, how I move, etc.
11	I would say backstories that interconnect
12	Collectables and interactions with other agents within the world. This is best done via NPC or flavour text provided by exterior sources, to elaborate on areas that would be outside of the characters main perception.
13	A motivation to go out and progress and improve as the player such as beginning with a lot of abilities and taking them away as it gives them a goal to achieve to get to that feeling as a player again
14	The world, or at least, details in the world. Games aren't words in a book, but in both you want the world to help tell the story. If the world feels empty or lacking in detail then you have to smack the narrative directly into the player like a blunt-force object.
15	Hero's journey
16	Player choice in how they complete objectives, if at all
17	The avatar that experiences the story who is also narrating is a vital role to the narrative.
18	Finding books/notes in the wild that are either filler, or contain a partial solution to a narrative questline that may open a different approach to the quest with the new knowledge
19	Cutscenes
20	Environmental design
21	Depth of character
22	Dialogues and noticeable environmental changes
23	World building; you see change in the world, you can tell something has changed/happened withing the story.

24	Tension
25	Being able to convey emotion. So sprites and 3d models being able to see what they are feeling
26	Dialogue
27	The ability for me to ignore the exposition of deep narrative choices made by the game designers that get in the way of my own player agency
28	Explanation, discovery, back story
29	The player being a part of the story. Being able to change the story
30	Immersive "show don't tell"; and exploration: let the player look round and discover the world, history and current story (and its effects on npcs/the world)
31	Believable motivations
32	NPCs
33	Cut scenes
34	Not sure what this means
35	Having more than 7 voice actors (LOOKING AT YOU BETHESDA.) In depth lore, in depth npc backgrounds
36	Having the world feel alive without the PC being there
37	what?
38	Music, camera angles, symbols
39	Dialogue
40	multiple endings
41	a compelling story and world building
42	?????
43	background/context, relatability, cut scenes (but not too many), dialogue between character and npc
44	The game designer.
45	the environment of the game
46	Environmental storytelling, player agency, meaningful interactions
47	Cinematics
48	Taking to NPCs
49	Reflecting the story through the game's systems (e.g. dialogue options, personality & reputation trackers)
50	End Goal of questing missions
51	Freedom to direct the narrative (e.g. through choice or dialogue or actions)

52	Reliving the story of an npc as a quest by putting you in place of the main character and having the objectives match what they have accomplished (see World of Warcraft).
53	The subtext, the lore, and the reaction to the world itself and the situations within it
54	What does this question mean and how do I answer it. If this is open to "anybody that plays games", the questions sound be accessible for them too. As it stands, I don't know what you want me to say, but I know they I dislike hypodermic needle they type narratives, where they tell you everything in the beginning, expect you to believe it, and have that information never change throughout the story. I prefer being drip fed little clues that I have to use my brain to understand and link with other clues.
55	I don’t know, I don’t play video games.
56	The level design can tell the player a lot about a place, even a change to the aethetics can make a level tell a different story.
57	Interpersonal conflict, morally ambiguous choices
58	Multiperspectivity
59	Immersions, relativeness
60	Dialogue and being able to show a story through the world
61	having information being about the world being obtainable outside the main narrative flow which adds a sense of challenge and mystery to discovering them
62	Text, voices, visuals
63	The player must feel like they're always preparing for a great challenge, and making the player make tough ethical decisions is always fun.
64	cutscenes, storytelling through the world
65	The world. If the world is not interesting no one will care about the story

(Figure 3.06)

4. In most cases, how important do you believe Non-Playable Characters (NPCs) are to a successful narrative experience?



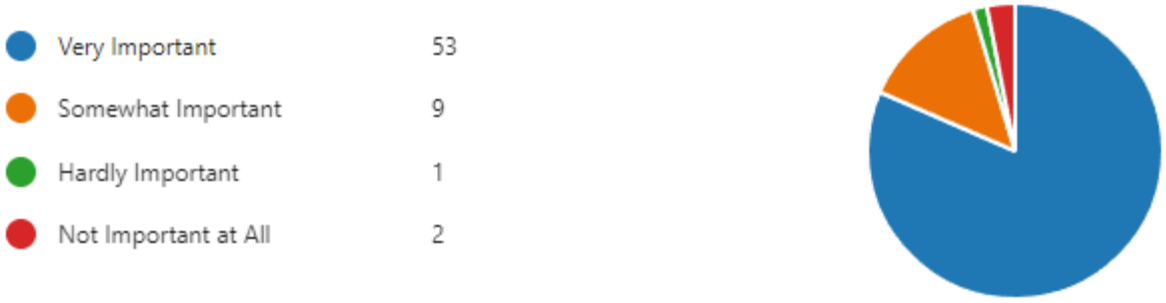
(Figure 3.07)

5. Regarding narrative context, how important do you believe that information be delivered to the player via NPCs?



(Figure 3.08)

6. In a game with NPC interaction, how important is it to you that variation exists for NPC personalities? (E.g. their motivations, fears, and general idiosyncrasies)



(Figure 3.09)

7. By improving an NPC's access to information in a game, how do you think they could perform better from a narrative point of view? (For example, what could they do with enhanced scripting of simulated Aristotelian senses of sight, hearing, taste, smell, or touch?)

1	Not sure
2	It can be a lot better by the way the NPCs talk and give information
3	being able to comment on changes, being confused/weirded out when weird things happen
4	Yes
5	They could make the game more immersive and realistic.
6	It can allow information to get to the character in more advanced ways allowing for further narrative development
7	Probably a lot better. As they would have more realistic reactions and thus feel more real.
8	Absolutely. NPCs are one of the most important parts of any story, not necessarily for the information they provide but *how* they provide it, what biases and personal beliefs they inject. The ability of an NPC to interact with the world in more varied means expands the range of means that they can tell their sides of the story.
9	Depending on the technology available, it could certainly allow NPCs to feel more real, and discover/understand elements of the world regardless of the player. However, this could also lead to players feeling less like the protagonist in their game.
10	AI Companions could react to the environment more? Along the lines of Elizabeth and how she aids the player with ammo/pick ups in Bioshock Infinite
11	They could go from being side characters to characters that the players will root for and want continued interaction with
12	This would bring a higher element of humanity. However, randomly scripted events and speaking points can achieve the same effect.
13	It would make them feel more believable to the player it also would make them more attuned to player choice which adds more branching narrative possibilities. This also would be good for player interaction such as if they heard you just attack near by enemies they may interact with you differently that if they didn't hear you
14	Possibly, though it's clear that NPC's aren't required to be super realistic to tell a good narrative. The Elder Scrolls Online is filled with interesting characters and plots, but outside of seeing enemies and crimes, I've never thought or

	cared about them lacking senses. In fact, a lack of senses can create humour without ruining any narrative.
15	Reaction to player actions
16	If they were aware of the player's actions in the world, how they regard the player can be tailored to how the player's personality compares to the NPCs' personalities.
17	I am unsure.
18	Additional sight information would be useful if you walk away from an npc going on a long-winded lore dump to explore the room/would allow them to trail off or express annoyance that you're obviously not paying attention anymore.
19	It could make them more useful in the narrative by being a help to the main character but it's not really necessary in my opinion
20	Simulating the five senses might be overkill, but simulating knowledge, memory, etc. would be very interesting
21	Be adaptable to your choices
22	It would provide ground for more exciting ways of communicating with the NPC, their reaction to the playable character would be triggered by the "smell" of an item the playable character is carrying.
23	Of course they would appear more beliavble as a character, making myself more immersed in the story, them mentioning my achievements to myself would make me feel appreciated in the story, detailed praise especially.
24	Better variation of reaction from Nov could create a more immerse experience for the player
25	It would make the world seem more immersive. Being able to see somthing is one thing. Being told how it smells and feels gives it a bit more to getting into the game.
26	I don't understand this question, but every bit new kind of interaction helps the player to get a sense of the environment in the game. It will help more or less depending on the story.
27	give NPCs the ability to be ignored or turned off.
28	Be more responsive in conversation ie reaction, eye and touch contact
29	Maybe more to do with the player's behaviours towards them

30	Maybe? The world must be believable for the player, and the NPCs are just part of that (if they exist at all). You can have an awesome experience and strong story without ever meeting an NPC (look at Portal or Subnautica); you can also build the story through strong characters and NPCs (like Thomas was Alone and Untitled Goose Game). Actual information provided by NPCs is usually ignored or skimmed over, unless the NPC is especially memorable or fun to listen to.
31	They would give better descriptions to the player, but I don't believe that would help the story much
32	They could react more to the world around them and actions from both the player and other NPCs. This would tell a lot about the people they are and storytelling is ultimately about people and their interactions with the world and others around them..
33	Interact with the players actions directlyl
34	Not sure what this means
35	Dude...I barely understand what you're asking here. I just play games, I am not an expert. All I want is an immersive rpg story, believable romance options, (75% of the male romancable characters in Skyrim are middle aged and bald/balding. Meanwhile all the women are young and attractive. Wtf?) tons of unique NPCs that don't all share the same 5 voice actors. (Seriously, just let office staffers record voices for unimportant npc voices, such as characters who only have 2 or 4 lines in game.) And NO FORCED ONLINE OR SOCIAL GAMING ASPECT. Oh, and make it last longer than 60 hours.
36	Yes. It would also be cool to have NPCs who have ulterior motives.
37	don't understand the question
38	They could react better to what the main character is doing
39	NPC's could react better to what the player does within the story. Creating a deeper and more unique experience
40	seeming more life-like, remembering and reacting appropriately to the player's choices
41	i don't know
42	Simulating senses is from one perspective reducing NPC's access to information. Rather than access information directly, you're now simulating

	what senses they'd need to access that information. For instance, how Skyrim enables you to rob a store if you put a bucket on the shopkeeper's head.
43	They can become more of a character or part of the world that is being build rather than just quest giver A vs quest giver B. By them being able to use more information, each interaction with an NPC could be more unique to the player
44	What are the fuck are you on about? Who is meant to be able to answer this adequately?
45	a better emotional range.
46	The way that they interact with the player, their overall agency would help. Deep narrative paths that change their reaction, interaction and attitude towards specific elements and characters
47	Theyd perform a lot better with more environmental factors, maybe they move towards a player if they hear them nearby or run to a new location when an enemy is nearby. Aiding in immersion
48	I think it would be extremely interesting. I would make the game feel more real
49	I think this depends on whether it's a sandbox-style game or a narrative game. Realistically modeled senses would be much more relevant in an Elder Srolls game than Undertale.
50	How NPCs react to player characters, for example, returning in a sewer type environment could have and adverse affect on how NPCs react to you, opening differing lines of conversation because of their disgust at the smell of the player character.
51	NPC's with a more complex comprehension of gameworld events - particularly those involving the player's decisions - would make for a more engaging interactive narrative.
52	I'm not sure I understand this question, but yea it would be cool if the NPCs reacted differently depending on the situation, according tona big decision tree or some advanced neural network. After a while talking to an NPC gets so boring, they just repeat the same stuff.
53	Information is less important to NPCs than reaction, if we're talking about narrative context. But if we're talking about coded information sent to their decision making AI, absolutely. If anything they look more intelligent, which in-turn creates immersion.

54	They could cower in fear whenever a gunshot rings out, or all run out of a room if you've just dragged a corpse into it.
55	Increasing their perception(?) make them more aware of their surroundings having it say things like: "something doesn't smell right..", or "did you hear that?" to let the player know that this NPC is more aware.
56	I think that would add a really cool element to a game especially if a character has knowledge you don't (for example if they recognize a sound that your character wouldn't or know someone's face from their past)
57	Refer to in-game events
58	More immersed in the experience
59	The NPCs would be more receptive to the world around them therefore making the world they exist in more believable, therefore making the story or narrative feel grounded in a world the players will care about.
60	It would make them feel more real and make it more valuable to talk to in the game rather than them being blank exposition dumps
61	Nothing? That's way too advanced. They just carry out scripted actions.
62	It would lead to an immersive experience where the player must consider every action they do and how it impacts their NPC companions.
63	they could be a more realistic addition to the storytellling
64	That doesn't really matter. They are programs, they only need to know what they need to know.
65	It is dependent on the genre of game. In stealth based gameplay, sight, hearing, and even smell should have a large impact. E.g. Before stealth quest, where the player must sneak inside of a prison tower, he see's a rare species of deer in the wild worth a pretty penny. He decides to kill and skin it's hide to sell for later use. He then approaches the tower. Unbeknownst to him, the sleeping guard dogs faintly smell the deer skin and blood, awakening from their slumber and attacks the player. If smell was not included, the dogs will stay asleep, leaving the player to easily advance.

(Figure 3.10)

8. How do you feel interacting with an NPC compares to real life conversations with other humans?

1	Not bothered

2	I find it better as it gives information
3	Depends on the NPC Dialogue
4	It’s not the same, but it depends on the game
5	Very different as NPC's tend to be quite robotic and repetitive.
6	It is almost the same as you are that character of you full immerse yourself in the game
7	With real human interactions the conversation can go anywhere. While with an NPC, after a while it turns into the same lines.
8	At the moment, NPCs rarely accurately capture the nature of conversations with real humans: their speech patterns and actions are pre-scripted, as are the player characters. This is not necessarily a bad thing at all: too much free reign may make it impossible for a player to follow the plot, and the fact that an NPC redirects the conversation constantly to important points of information allows the player to easily understand the plot's intentions.
9	For the most part, very different. Most games have NPCs feeling very robotic, with unnatural speech patterns, incredibly structured conversation and strange exposition dumps which would never happen in real life.
10	I don't freely form my own responses so it's always more of a 'spectator' action
11	Most time feels like youre talking to a bot
12	(Human -1). NPC's in gaming, will be very reminiscent to the first large scaled AI interfaces.
13	NPCs interaction is often Stilted in most games as they have a set behavioural pattern that sometimes can be hearing when interacting bin game as it can ruin immersion if done badly such as repeating the same line again and again regardless of the situation around it
14	Depends on the game. No one really expects NPC conversations to match reality and I don't think they should have to. Once again, it can create humour whilst keeping a great story and can be sometimes more effective then a realistic conversation, considering the conversations I have tend to go nowhere.
15	It can be great sometimes but can sound stilted when compared to IRL.
16	Being able to quicksave before a conversation so I can go back in case I mess up is a lot easier than trying to hold a real conversation in a single take

17	That would entirely depend on the makers of the game. NPC add to the experience of the game but don’t do much after that fact. Only when a NPC is vital to the story line (sidekick to main character) is its influence a vital part of the game.
18	It doesn't.
19	Mostly it can feel natural in regards to the story but they can't speak anything outside of their scripted dialogue while humans can talk about anything
20	It's almost nothing like it
21	Very wooden, sometimes npcs only give your character a quest, a good back story is important
22	the NPC contact is always limited and directed, which is barely the case with human communication.
23	Its pre-set, although some games (witcher, fallout, tell tale games) provide you with dialogue options, most of it delves into either rude, polite, flirtatious, ignorant, etc etc. There arent mixes of points which you can potray. So i guess if anything its limited.
24	Stale and somewhat robotic
25	I like having dialogue options in game cause I dont have that in real life, it's harder to talk to people I dont know.
26	Humans are way more unpredictable, real conversations don't have any particular goal most of the time, real conversations suffer much more from miscommunication or stuttering than game ones, NPCs conversations are limited but, as they are prepared beforehand, they can be more witty and fun than real ones.
27	It a game I don't wan't my in-game interactions with game characters to be credible human experiences or exact simulations it would ruin my sense of fun and play.
28	Unemotional, unrealistic and npc show no response to humour
29	Npcs are much easier to talk to. Jk. Npcs conversations never feels real. Always feels like slowly scrolling through a spreadsheet of responses.
30	In a game, it is much more functional: why do you interact with the NPC? what info do you need to give or receive? How useful is the NPC to the story? In real life, there are many people you will treat exactly like an NPC (like a faceless bank teller), and many you treat differently because all interactions

	are defined by the relationship you have with them (and of course there's a gray area between these two extremes).
31	If the NPC is believable then it feels real, like talking to another human, even when you have only a few fixed options. When done badly they feel like a wordy signpost, babysitting you through your adventure
32	As you have little choice on how to react or respond (even RPG's have only a few dialogue options) it sometimes feels like you can't always say what you want to, like you could with real people.
33	NPCs appear much more robotic as they usually loop the same few sentences. The new NPCs in the Last of Us 2 look crazy interesting as they all have their own backstory/react to one anothers death.
34	Scripted, not real, still important though (like reading a book or watching a movie, I know the answers are always going to be the same but that's okay)
35	MUCH better. Chances are the NPC isn't an edgy 14 year old puberty-squawking racist whose mommy has no idea that her precious angel calls people the n-word while playing online.
36	Better because I can awkwardly stare at them without them freaking out.
37	talking to an npc is a lot less engaging and a lot more predictable than talking to a real person
38	So far, very scripted and limited
39	Currently. Dialogue in games can often feel very wooden with only a few games standing out among others. The opportunity to have a seemless and almost realistic interactive experience with an npc is exciting
40	usually very scripted. lack of choices in interaction
41	it feels weird, because you can't predict what people in real life say, and you don't have a ton of time to think in a real life conversation
42	limited
43	Somewhat more scripted. NPCs can have only so many lines. Also reacting to the players actions really help bring life to the NPC
44	Depends on the human.
45	somewhat slower then real life
46	I feel like on the day to day basis, interacting with people that are serving in some way, is like an NPC interaction. Minimal interaction, only in that space for one reason. Same goes for passing by. Unless there is a connection

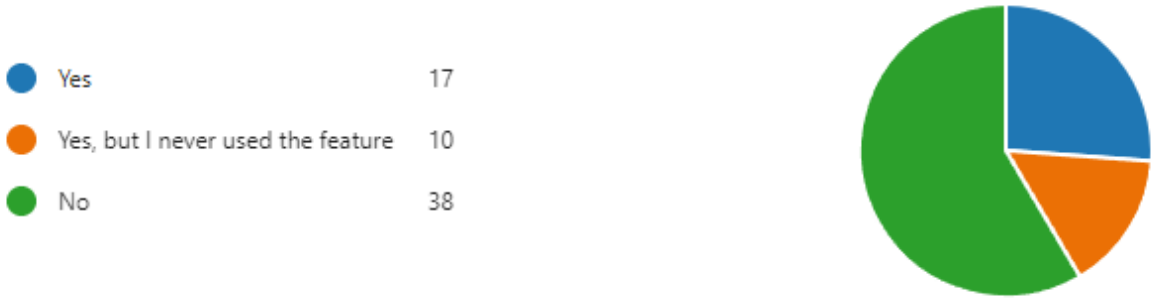
	between the two parties it's just the generic chit chat. Deep connections are vital for human communication and we only get that with a select few people we know.
47	Linear games tend to feel more realistic whereas games with a lot of branching can end up feeling very scripted
48	real life conversations are better because a human being can't be poorly written
49	Very different. There'll always be the artifice like talking to a guy until he runs out of dialogue or repeating conversation trees to catch options you missed. i don't think games will ever truly simulate human interactions, nor should they try to.
50	Not realistic, this is not an issue however as NPCs are essentially a means to an end in pushing a narrative forward
51	Limited compared to real life of course, but still engaging on a basic gameplay level. If a gameplay has dialogue/event choices that limited agency is enjoyable, though games cannot yet accommodate a web of interactions complex enough to reflect human conversation and emotional depth.
52	I hate it when they give you a long ass text to read and go on to kill 5 murlocs. That's boring. Voice acting and the NPC gesturing is what makes it similar to humans.
53	In the sense that it often involves stopping what you're doing to listen, or worse, being stopped to listen. Hence why dialogue during action or encouraged.
54	There is no comparison, because people can react, and it's genuine, and they're there, in the moment. It's as special for them as it is for you. But with an NPC? There is no emotion, they don't care, there just programmed to say a few lines and point in a direction. Players > NPCs
55	It really depends on the AI and/or the dialogue options. in some games it could be comparable to real life, but it most it really isn't.
56	If an NPC is well written it is very interesting to speak with them and get their opinion on things, like if they are a lawful evil NPC who has interesting justifications for why they believe something. Usually NPCs are not well written though and it is not interesting to talk to them
57	Scripted

58	Depends on the game but mostly less realistic unless I am very immersed
59	It's much more structured and less free flowing. In real life anything can be said but an NPC in a video game has limitations. If it is an NPC in a tabletop RPG then they are typically fairly similar as it is a real human speaking
60	there is obviously a very big difference between human interaction and NPC interaction one that at the current time i dont think can be mimiced into video games and arguably shouldn't be someones substitute for human interaction
61	Less stressful.
62	As of now, there's a suspension of disbelief when I'm talking to NPCs, but I like to act like they're real. Any repeated dialogue kills the immersion, though.
63	that's quite shitty, im afraid
64	Its different but can be similar if given good dialogue options
65	Currently, not many games have such sophisticated conversations player to NPC wise. There are some decent attempts, however, such as Fallout New Vegas. I feel that as time progresses, and (hopefully) RPG's become more popular, game devs will soon focus even more on narrative and immersion for players.

(Figure 3.11)

C. Section 03: Natural-Language Interaction Questions

1. Have you ever played a game that allowed you to interact using your own voice?



(Figure 3.12)

2. If you responded with yes, please describe these experiences. Otherwise, please describe your reasoning for either not using the feature, or not playing a game that included it.

1	Dont know any games that use this feature

2	I don't know never used it
3	I've never seen the feature except in MMO games, which I don't play
4	I've just never encountered a game with that feature, if I did I would try it.
5	Never really interested me.
6	The game alien isolation allowed the user to have a more engaging experience by tracking noise through either a headset or an Xbox Kinect this meant any sound you made the alien could hear and track you down. Made for a very fun game play
7	I didn't use it because it was with the kinect. Although with the PlayStation 4 you can make it do commands with your voice. While I rarely use it, when I do it is helpful.
8	I played an old shooter named 'Binary Domain' that used a voice feature. It was awful. The system only allowed for a few sets of key phrases that were only understood a small percentage of the time. That and the fact that the game was generally awful regardless.
9	Though I've never played one of these games, I remember hearing about the technology and it always seemed a little awkward and unwieldy. Hoping a game understands what you're saying never seemed as accurate or reliable compared to just pressing a button.
10	Frustrating -- delay between speaking, finding out what it thought I said, and how it should react
11	I have a lisp so most of the time what i say isnt recognised
12	As was an older game, it was very underdeveloped, simplistic and barely worked.
13	Never played or found a game that implements it
14	I don't need to. If I'm after a story, even in a game with an entirely linear one, most of those games have a voice chosen and if they don't, I like to imagine. Games are another life for me to live and I want to keep it that way, rather then try to bring reality into them.
15	N/A
16	I'm not confident that a game with this feature would be able to correctly interpret my voice consistently enough to not be irritating.
17	This is a great idea but the AI would have to be sophisticated for this to work appropriately.

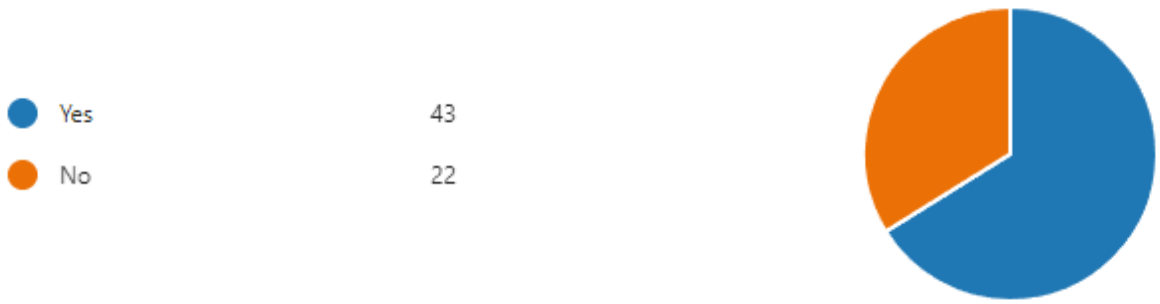
18	Never been an option in the titles I play.
19	Never really was interested
20	I just don't own one of those games
21	N/a
22	Never had the opportunity
23	Havent had the idea to experement with these kind of games.
24	Was never particularly interested
25	I played nintendogs but it wasn't all that good.
26	Aside from online games or 2 player cooperation via mic games (like We were here), TWEWY had a mechanic where you had to shout which seemed unnecesary and clumsy to play with, Ace Attorney had a case where you had to talk I think? Again, didn't really like it, felt unnecesary, there was no purpose behind using the mic.
27	Mike and Greg and Stu made a VR game where you shouted at the game. Its was a fun game play mechanic.
28	Haven’t had a game with it
29	Google home mini games. Quite janky
30	Not native English speaker; also prefer not to talk to a game; also even with quite fluent English (I grew up) speech recognition is unreliable. It's also slow, and gives the player no information about what words/verbs/sentences would be accepted/interpreted well by the system. The Hitchhiker's Guide to the Galaxy game was a bad offender - you could type anything but a lot was not recognized and occasionally you had to type in something non-intuitive, which made solving some puzzles really frustratingly hard.
31	I’m just not hugely interested honestly
32	N/A
33	It was in the PT demo, it was thought players had to call the name of the ghost to proceed.
34	Never heard of a game with it
35	Lol, so I had Hey You, Pikachu for N64 and there was nothing more enjoyable than saying, "PIKACHU, THUNDERSHOCK!" I was 23 and had ZERO shame about loving the hell out of that game.
36	Just haven't had a game
37	i didn't own a headset

38	I haven't played a game like that, I didn't even know they existed
39	I did not use the feature simply due to personal preference. I felt like I'd look a little stupid talking to myself in my room playing a game.
40	never found a game like that; voice interaction is inconvenient + inaccurate
41	i don't have a system capable of playing those games
42	Not a lot of games have it.
43	I have just never bought a game that you use it. It has not been intentional.
44	Kids use this on shit games
45	it wasn't very responsive and didn't work very well as a mechanic.
46	I played RUSE and Tom Clancy's End War. It wasn't the same as say interacting in live games like Gmod or VOIP, but you could command your units using your voice. Some horror games like Alien Isolation and SOMA let you use your voice and heartbeat to interact in the game, using it more as a tell as opposed to consciously using it.
47	Never interested me
48	I like to play quietly
49	n/a
50	N/A
51	Games like Skyrim and Ruse allowed for basic voice interactivity (to activate abilities). I didn't use them because I found them to be a gimmick rather than a well integrated control input. If the voice input only equates to the press of a button then I'd rather just use a controller. More complex results (I.e. a simulated conversation) would have me use voice controls.
52	I have never seen a game that allowed you to do that. Hmm, it would be cool though.
53	Nintendogs, where talking into a mic can give commands to the dog. The DS microphone often distorted the commands however, and I failed the obedience trials with flying colours.
54	All of the best memories I have of playing videogames come from me using VOIP. If talking in games was never added, I doubt videogames ever would've been very popular, or at least as popular as they are. They're such a central part of videogames. Take "Squad" for example, or "Sea of Thieves". Without VOIP, those games would be unplayable.

55	Does SingStar and American Idol Count? If not, The legend of zelda: Spirit Tracks requires you to blow into the microphone to play the panflute. not my exactly my voice, but it required a microphone.
56	I prefer games with written dialogue rather than spoken like Morrowind vs Skyrim because there is potential for longer and more in depth conversation. If I walk past an NPC and they spout the same dialogue over and over it quickly becomes really annoying. I wouldn't not play a game with voice i just havent encountered it ever
57	I was not aware of the existence of such games
58	LOTZ Phantom Hourglass/ Spirit Tracks I'm pretty sure had them. I did not enjoy the features as they made the gameplay more frustrating to get past the segments that required them.
59	Never had the opportunity/ owned a game like that.
60	im not sure of any games that use this feature but would be intrigued by it
61	I don't even know of any
62	I assume you mean a voice communication with NPCs, and not real people. I've never played a game like that because I didn't know they existed.
63	n/a
64	It was multiplayer and I didn't want to talk to anyone and just enjoy myself
65	The main reason as to why I don't use the feature is that it is more of a hindrance for me. The tech as a whole just is not advance enough for me to use in a daily setting like that. Either my speech is unrecognizable, is misread, or takes to long to process. Just overall not my cup of tea.

(Figure 3.13)

3. Have you ever used a voice assistant? (For example, Alexa, Siri, Google etc.)



(Figure 3.14)

4. If you responded with yes, please describe what you've used the voice assistant for. Otherwise, please express your reasoning for not having used one.

1	Google
2	Haven't used
3	Asking Google for the weather
4	I use them occasionally for general questions, but not often.
5	To search things or set timers, alarms, ect.
6	Playing music, news and weather updates, contacting people with hands free
7	Used SIRI on my Iphone, now google on my androids. Google tends to always pick up on what I'm asking.
8	I only extremely rarely use a voice assistant, and mostly when I needed my hands free such as during cooking. As for why most people who haven't used one haven't used one, University Students tend not to be able to afford £80-£130 amazon echoes or £1000+ Iphones, and google assistant is very poorly advertised. And Cortana is awful.
9	I've played around with Siri and Alexa, but again it never seemed as useful as just typing in what I want.
10	Skipping songs at a friend's party. Not a fan due to privacy concerns.
11	I use it to play and pause music, set alarms and timers
12	Literally all manner of search functions.
13	Just for helping me do things on my phone when my hands are full
14	I played Skyrim Very Special Edition on Alexa two or three times. It's not quite as good at telling a story as the other Elder Scrolls games though.
15	Pausing, timers
16	I'd rather not state out loud what I'm searching for online
17	Voice assistants can be useful for maps when trying to locate a place.
18	Don't see the need.
19	Never really got into the habit of using them.
20	Setting alarms
21	Siri
22	Set alarm or timer while cooking/working
23	I do not trust devices like these, i also have no need for one.

24	Playing music, the novelty of the feature, finding information
25	I never saw a need
26	Testing what could do and see if it got my words right. Seeing that you didn't really have to use it to use the features, and that you spend more time talking than looking for the feature yourself, I didn't use them more than that.
27	Mostly checking the weather and setting alarms and turning on and off lights anything else is far too much personal privacy than I am willing to hand off to a third party.
28	Yes. Obtaining directions, requesting music
29	Shopping lists, timers, music
30	Tried Ok Google a couple of times, then disabled it after realizing it would be faster and easier to just type.
31	Typing works just as well
32	N/A
33	Alexa, playing music, setting timers, random questions, asking for the weather
34	Directions while driving
35	Just google and it's mostly useless. I can't figure out how to get it to do anything other than set an alarm and say "here are some search results" when I ask it anything. I mostly don't bother with it unless my hands are dirty.
36	Poor college student. Don't have money to obtain.
37	because i can turn the lights on myself
38	Random number creation, alarm setting
39	Setting timers/reminders . Ease of access for BASIC functions I'm often too lazy or in a hurry to click through.
40	briefly; stopped due to inconvenience/privacy concerns
41	usually just stuff like jokes
42	Haven't bought one. I have been present while other people are using their voice assistant.
43	I use Siri to check the weather, give me reminders, set up events, and to call people.
44	For Spotify on Alexa
45	I feel like i'm quicker without using it. also it can be very unresponsive.
46	.
47	Searches and setting reminders

48	I don't like them
49	n/a
50	Alexa & Google Home used at home to play music, weather, day planner etc.
51	No prevailing reason, just haven't adopted using voice assistants on mobile devices and don't own anything comparable to a Google Home.
52	Setting a timer during cooking, adding a reminder when my hands are full. They are not yet that great. For example they don't understand "Hey Google, cancel my alarms for today, I want to sleep", while a human easily would.
53	Nintendogs, same as above
54	I never need to use one. I type much faster than I speak, so there's that too.
55	controlling the music whilst doing the dishes
56	Playing music mostly while hosting a dinner party or gathering
57	No added value
58	I have just never owned a device that used it.
59	Playing music on Alexa
60	mainly use the alexa for the time if i dont have my watch on or telling about the weather on certain days
61	Why would I?
62	Simple things like reminders, weather, alarms, and announcements.
63	basic things like execute chrome or the like
64	Remind me about meetings
65	I used to use it for Google's assistant, but I stopped due to my change in views of privacy. I basically became more precautioned in that regard

(Figure 3.15)

5. Considering how voice assistants are used, how do you think these interactions can translate successfully into a video game environment?

1	Immersion
2	Haven't used
3	Maybe? It depends on how the featire is implemented
4	I think so yes.
5	In a military or strategy game you could give commands to NPC's. Also you could talk to NPC's.
6	Yes

7	The game Elite Dangerous had a mod that allowed for third party software good be used for the player to talk to an AI. I think that this would fit games with an AI companion. Such as that and other games like The Division. As the player can ask specific things like "Scan area" or something like that and be more immersed in the world.
8	I do believe that interacting with a well-evolved voice assistant-like NPC would be excellent for storytelling, however, there's a big technology gap that would make such an interaction extremely difficult. Voice Assistant 'AIs' take many years of work to evolve, and require large, extremely expensive server banks to work 24/7, racking up extreme expenses. If a game *were* to incorporate one now, it would be a highly expensive venture, and they could only incorporate a single Voice assistant NPC.
9	I honestly don't, at least until the technology makes big advances. It's nice to imagine having fully-fledged conversations with NPCs, but in my experience both voice controls and AI still need development before that would be possible.
10	General and short vocalizations instead of full sentences
11	I feel that with development it could be the future for role playing games
12	At this current stage, unfortunately not without having to script the entire database with a more human voice. However, a science fiction game set in space could use the service outright.
13	Well they often do have slight personalities which you can attach to. It can also increase imersion and therefore increase investment in a narrative.
14	I'm guessing this means using your voice to trigger events in-game? I'd say it could absolutely be translated into video games. Is it needed? Not really. It would be an interesting and fun mechanic but not for me and not needed to help any games narrative.
15	Text adventures.
16	They could translate well in the form of a companion AI in a sci-fi game for example, searching through the game world's own repositories of information and lore in much the same way that a real assistant searches the internet.
17	It would help the player not have to type whilst playing.

18	They probably shouldn't. Such software is already unstable around accents, to accommodate accents/languages would just be a pointless waste of resources in the name of a gimmick.
19	It could add another layer of depth if implemented properly
20	Telling your ship computer what to do?
21	Being able to speak to an npc and they understand would be an amazing step up in video games
22	I would argue that it would translate well in the near future, but maybe in the next 15 years, it could improve.
23	I think its very early for technology like this to be imported into the game enviroment, since npc's need to have a personality to be able to respond accurately to anything you say, instead of again responding to what they think you said instead of pre-written angry respone, agree response, provide info response... etc etc
24	Could help create a less scripted conversation with npcs
25	I suppose in like Nintendogs it would be nice to have things happen on screen when you say aomthing but I dont like the feature
26	On a limited environment to minimize errors (which could frustrate the player), on a story that heavily justifies the use of the voice (kind of how Her story justifies the database mechanic with the setting) because if not the player feels it just a silly mechanic, and on words that are short and the player doesn't spend too much time talking, because it's tiring.
27	I am very scared about the privacy implications of that concept.
28	Quicker to obtain the information you need
29	Some of them
30	Would be difficult without an AI who'd come at least close to passing the Turing test. Would be nice for a sandbox game in which you could form relationships with many npcs though (like Stardew Valley or My Time at Portia style games), but then you'd also have to make sure each NPC had a distinct personality, and could learn/adjust to circumstances. Speaking as a software developer with 20+ years of experience in AI and heuristic algorithms, I'd consider that hard to near impossible.
31	Talking to an NPC, asking them specific things and having them react in a seemingly natural way would be awesome

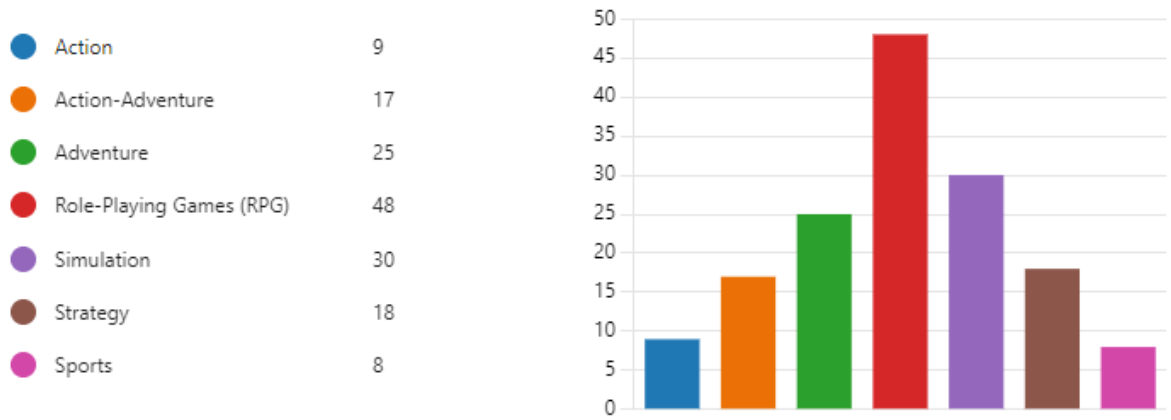
32	Voice assistants could be used to create systemic or procedural generated dialogue for NPCs based on what the player says or does.
33	Yes, it would be a very immersive feature.
34	No idea
35	Depends on the game and how it's used. I definitely do not want to have to talk to the game for every input, but I can see it adding an extra layer of immersion! I'd love to find a traveling merchant and say, "Excuse me! What have you got for sale?" to start an interaction rather than running up and pressing E.
36	With more development, sure.
37	wait, you think that being able to use alexa or google's version of alexa to play video games will be successful? lol, playing a game just by talking seems boring
38	Possibly yes
39	I beleive Elite dangerous has implemented the ability to program your own voice commands into the game so that you can controll your ship easier. This is interesting and would be fun to use but I feel like the novelty would run out similar to that of voice assistants. I barely use them and the initial novelty of them wears thin fast
40	carefully, with very good voice recognition software
41	most likely
42	One drawback is I frequently see people need to repeat the same command multiple times to be understood, so real-time control could be too frustrating. It needs to be a slower-paced game. (For the purpose of question 17, Seaman is a simulation and text adventures like Colossal Cave Adventure are adventures)
43	It can be clunky since you need to say the assistants name first then the command. Even then they don't hear you or understand you sometimes, especially if you have an accent.
44	You can scream at the NPCs
45	if the dialog options were very advanced you could have a game in VR were you also physically talk to the NPC's
46	I think with enough research and looking into how it can be applied without being cumbersome or awkward to utilise, I can see it being quite interesting,

	specifically interacting with AI and companion characters that manage inventories. It would be similar to how me imagine talking to an AI from movies,
47	In terms of interacting in the world, it would probably add to immersion, whether it would interedt players however is debatable
48	No, AI would have to evolve more.
49	Don't really know or care honestly
50	In a sci fi type RPG game VA could be used via a sidekick type character to allow you to set reminders/converse with to plan missions etc.
51	Ideally players should be able to hold emotionally convincing conversations with game NPCs using their voice. Particularly if the game is heavily narrative-based. I can see convincing voice interaction (if well implemented) as a major paradigm shift for game interaction and immersion on par with virtual reality.
52	They could, that would be really fun. For example in VR games you could shout the name of the skill you want to use.
53	Currently it only works fluidly in multiplayer, where the infinite number of possible inputs can be responded to by another person. To craft an AI which can have a conversation would take years of switch staements, not to mention vocal nuance and bad grammar blurs the lines enough.
54	They could, in fact, lead to a much more vibrant world to interact with. I hadn't really though about it before, but now that you bring it up, that's actually quite a good idea. Give the AI some parameters and some emotion, tell it how it generally will react and how it feels, and you can get some unique responses to questions. That could be very cool!
55	It would be an interesting approach, I'd be interested in seeing a text based game being turned into a speech based game. i.e.: Zork
56	I think this sounds intriguing as long as the voice recognition is good
57	When combined with classic dialog choices
58	Other than Mass Effect, I don't think there has been a major success in the video game environment but I believe if it is used as a model, it could be a staple.
59	They would have to be further developed to not disrupt the players immersion (due to accents and microphones not picking up the correct words) But if this

	feature worked flawlessly then it would be great to have an NPC th player could directly talk to.
60	yeah the use of a voice assistant in a game could be simulated (especially in sci fi games) as an AI companion and could be utilised very well in stroy telling
61	With great difficulty?
62	With a little more refined AI to be capable of casual conversation, I'd love to see that.
63	it could be
64	I'd rather not have them
65	As AI and tech advances, voice recognition will only advance as time progresses. This advancement will co-exist with AI's responsiveness to said speech recognition. If used correctly, there is great potential in faux-reality conversation. It would be revolutionary to both gaming and technology as a whole.

(Figure 3.16)

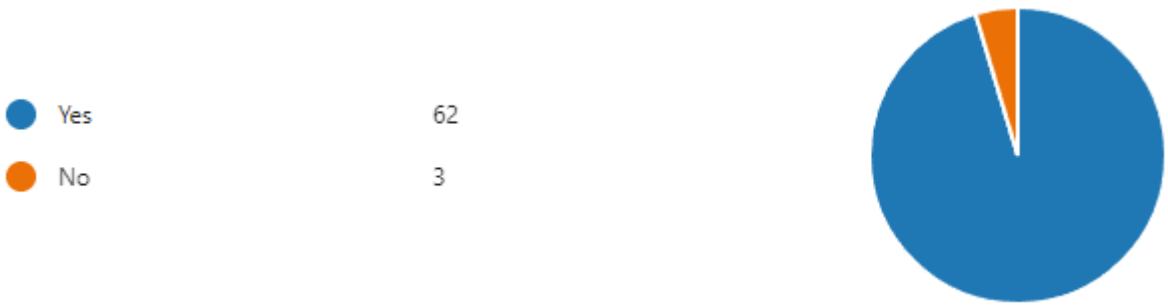
6. What video game genre do you believe could benefit most from using voice interaction?



(Figure 3.17)

D. Section 04: Human-Computer Interaction Questions

1. Do you think the way humans and computer systems interact is a changing landscape?



(Figure 3.18)

2. Explain why you think this.

1	Computers and humans are constantly advancing
2	As the humans can change how everything is in it
3	Computers are getting more and more advanced, and so humans have to adapt how we interact with them
4	Computers are getting more advanced.
5	It is opening many new possibilities.
6	I believe as technology advances the way humans and computers interact will continue to change and grow until there is no difference between humans and tech interacts
7	Because the games industry is in a golden age. As is most of the computer era. We are making fast progress with everything. Meaning that we could even get to the point where the AI does a lot more functions. Things like google home are a good example of this.
8	Simple. Technology is becoming more advanced and more integrated to humanity over time. The Human Swarm intelligence is only becoming more important and more intrusive as we go, and we have to accept this. In addition, many strives have been made recently to allow more humans with disabilities to play video games.
9	We keep developing new ways to interact with machines (motion controls, speech, VR etc), but generally speaking we keep falling back to the most practical inputs - controllers, keyboards, touch screens.
10	Technology continues to develop. The eye-tracking is particularly exciting.
11	More use of Ai and machine learning
12	The march of progress dictates this. As we develop the newer technology, we will become more like AI before AI become more like us.

13	Well originally you had to enter laborious command lines that took forever to input and learn and then to GUI's that were quicker to learn and use to the likes of Alexa where no learning is required as you use your own voice for instructions that you want
14	Well, it is. Computers become more advanced, humans find more ways to interact with them or to have computers interact with things themselves. I don't think however, that it needs to be changing, at least in terms of video games.
15	As AI gets more advanced, more options for interaction open up.
16	Voice input itself is a recent development, as much as different styles of controller were once developing ideas and how virtual and augmented reality increase in capability by the day.
17	Computer systems are forever evolving and are continuing to interact better with humans.
18	VR exists.
19	If eventually computers reach a point of having really good AI it would change our lives.
20	We're able to interact with computers on a more direct (less abstract) level
21	Computer systems are able to recognise what you say in ways it never has done
22	Technologies are developing, we can monitor even more things now so of course it is continuously changing
23	Think abour siri, alexa, bixby. At the moment its commands and functions how they work, simple yet still used by people world wide (if you have access to it). Its is but time until you can add a personality to your siri/alexa/bixby and get answers to mundane questions which fit the type of personality chosen (ironman jarvis style).
24	The more advanced technology gets and the better our understanding changes the way things are done. New ways of playing games will pop up all the time but whether or not it will stick is a different matter
25	People are evolving getting smarter so when they get smarter they make better faster computers. It will always be changing as we get better a better understanding of how things work and how to best suit people
26	It's a fact that it has been changing for decades, so it will probably remain changing to accomodate new needs.

27	We are trading convenience for privacy at every new step change in technology and this is not a good trend.
28	Computer systems are becoming more knowledgeable
29	AR and voice control getting better
30	Because the subject of the interaction changes over time. Just compare the way computers are used today to the rather static internet 10 years ago to the standalone apps of 20+ years ago.
31	It’s a very fast growing industry right now and theres still a lot to learn I think
32	The way that humans have a control over computer systems hasn't changed in my opinion. Although interactions may be simpler or quicker than before, they are relatively the same.
33	Computer systems are getting better at being human
34	Technology is always inproving
35	I don't really know. I'm tech-stupid, but I know it's getting into creepy uncanny valley crap in the past few years. Algorithms will end up becoming sentient and then we'll have Terminators going back into the 1980's to kill people. But it'll be cool for the 3 months before sentience because we will likely get it to shitpost memes with us.
36	We
37	because artificial intelligence is getting better we can give a computer less input and have the desired result
38	Touchscreen, VR, all those didn't exist when I was younger
39	There are always new and exciting things coming forward to the industry. I often find it hard to keep up.
40	technology is advancing rapidly; growth of AI, etc.
41	people are allowing computers to do more things
42	Because the capabilities of computers change.
43	Technology is rapidly developing. We are starting to create new environments that humans interact with differently, like VR. The way the markets work, there are always people and companies looking to create the new way to interact with games.
44	That's like asking "do you think technology changes"

45	the more and more we integrate with AI's and advanced mechanics it could easily change games for years to come. by giving use ever changing options or real time dialog
46	We are becoming more connected and personal with them. They are more than just machines that we use, they are a way of life and deeply ingrained within our culture
47	AI is being used more and more in life, especially home life, so much so that it might get to a point where we have to do less and less of the easier tasks in life such as shopping, cleaning etc.
48	because AIs evolve and change
49	Virtual reality, widespread adoption of high speed internet and increasingly powerful hardware allowing new types of games (especially online, e.g. Fortnite) to exist.
50	VA is still fairly new tech and is only recently being implemented
51	Persistent advancements in all areas of computing interaction. A main driver is machine learning and the push towards general AI, but even things like improved graphical fidelity and computing power make for more engaging human computer interaction.
52	VR. Can't wait for it to become better and cheaper.
53	Improved AI and improved microphones
54	Technology is advancing quickly, and when the technological development slows down, people start to think of brand new ways to use old tech; there's always innovation. People like money!
55	As we further develop better technology we can find new ways of interacting with computer systems, say how Pokémon Sleep will now allow us to interact with games during our sleep. surely it won't connect the game to our dreams, but its a new way of making a game.
56	Technology is constantly evolving and as PCs become more powerful and engines become more sophisticated it opens up possibilites for what can be done technically
57	It's a quickly changing landscape
58	We rely more and more on technology as there are improvements
59	new interactions are constantly coming out, changing how we interact with computers and phones, whether that be through all touch screens with no

	buttons on phones or games that use virtual reality. It is all different to how we interacted with them 5-10 years ago
60	with technology advancing and people ever in effort to make computers smarter people have to adapt to how they use them to keep up with these changes to the computers intelligence
61	I don't really understand the question.
62	Phones are almost an extension of ourselves at this point. Programming is turning into Machine Learning creation rather than hard-code. And eventually, we're going to create a General Artificial Intelligence.
63	voice command is a thing now so...
64	More can be done, but in reality doesnt really need to be
65	Technology is bound to advance. This includes human-computer interaction, especially in the field of AI. It will always get better with more practice and time to develop and mature. I feel that deep learning and other similar neural-network types of learning is the future in this development of human-computer interaction.

(Figure 3.19)

3. Think about a positive interaction that you have experienced with NPCs in video games, describe why this stands out to you.

1	Advanced Ai in stealth is really good
2	Whetley and Chel the speech of whetley helps chel out and other things throughout the game
3	N/A
4	I’m not sure what this question means sorry.
5	In games like RDR 2 the player can go out of their way to greet or antagonize NPC's which can lead to fun gameplay.
6	One of the best human computer video game interactions would have to be halo, the way the master chief interacts with cortana throughout the game play shows how technology could advance in the future
7	Well, the main one I could think of would be the game itself. Things like UI and what not. Despite that I tend to turn most of the UI off. The fact that the game gives me that choice is always nice.

8	This is a slightly poorly worded question: do you mean an interaction within the medium, or a real-life interaction I made while playing a game (such as an interesting control method?). For the first assumption, I really think that the interaction between the lone survivor and the renegade synth nick valentine in fallout 4 is clever, as it basically ignores the fact that Nick is non-human until the traumas of his past are brought to life as Nick grows to care for you more. As for real life, I think Microsoft's "when everyone can play, everyone wins" idea is great.
9	That's a pretty vague question. Most human-computer interactions I have with video games are positive, otherwise I wouldn't play video games. They're fun.
10	Nothing specific -- mainly generic things, such as endearing unprompted dialogue while exploring a world. As I saw something new and mentally commented on it, so did the NPCs after I'd had a moment to take it in.
11	New quests. Adds another element to the story
12	Deep scripted cut scenes allowed for further emotional response. However, equally the opposite in a game also yielded the same outcome.
13	A good computer human interaction I can think of is in most FPS games as the controls especially on controllers is quite intuitive as the control layout makes sense
14	The NPCs in Hollow Knight are nothing but positive interactions, even in the darkest of times. They are in-depth, feel fitting to the world, every character is unique and diverse, letting you get invested in all of them. Yet, they're also extremely simple at their core and its that simplicity that I enjoy. It proves you don't need fancy stuff to make something so amazing with characters.
15	Racing games, when an AI cuts you off or pulls a good driving move it makes the experience more fun.
16	I've been playing Skyrim recently, and while its RPG elements aren't as pronounced as in previous Elder Scrolls titles, I've found the writing of the NPCs from a narrative standpoint to be adequate in delivering information and helping the player get to know the world around them.
17	Non particular comes to mind
18	Life is Strange- voice acting/music combination in the scene. Nothing to do with AI.
19	I can't really think of any such interaction from the games I have played

20	Animal Crossing NPCs because they seem like they have personalities
21	Fallout use fantastic npcs all each have a different back story which gives you a very wholesome player experience
22	Usually the choices for interactions in such situation are wide and useful for the advancement of the storyline or gameplay.
23	Playing witcher 3, spoiler alert: when i finally met character ciri ,it was an immensely satisfying moment, i was relieved after going through so many challenges and tasks that i phyiscally felt achievement once getting to talk and interact with ciri.
24	When my player does certain action that and NPC likes which then changes the gameplay it makes it feel more real
25	One interaction I can remember is with the nail Smith from hollow knight after he's upgraded your weapon to the best it can be he leaves his home and asks that you kill him with it. It doesnt do anything game play wise if you do it or not but it is one of the things I can remember.
26	Celeste, the old woman. Because I like funny and witty characters and I really like how your interaction with her slowly changes throughout the game.
27	They are fun and they have made the gameplay more enjoyable.
28	Helped to advance
29	Elite dangerous voice commands
30	Every time a character proves to be memorable, regardless of whether it's a player or NPC. GladOs, Guybrush Threepwood, Wrex (Mass Effect), Sullivan (Uncharted), Dormin (Shadow of the Colossus), etc. Loved the interaction and banter of the two engineers (Kenneth and Gabby) on the lower deck of the Normandy in Mass Effect 2, and the humor of Mordin Solus in the same game.
31	I can’t think of one, sorry
32	My interactions with Atreus in God of War. Although I had little choice about how the relationship played out between Kratos and Atreus, seeing his develpment through the game, helping him to overcome challenges gave me a sense of pride, as if I was stepping into Kratos' shoes as a father.
33	Ellie smashing some dudes face in as he was pinning me to the ground (The Last of Us) makes you feel like you have someone actually helping you out
34	Not sure what this question is asking

35	I have LOVED the Interesting NPCs mod for Skyrim. (also known as 3DNPC) The NPCs it adds have more than the standard 17 lines. It's ACTUALLY fun to have convos with these cheaters and makes them feel a lot more real.
36	Talking with policeman in Call of Cthulhu
37	can't say i had any memorable interactions with npcs so none of the positive interactions stand out to me
38	Good voice acting
39	Companion development within RPG's has always felt quite appealing and fun to me. The experience and feel that I've managed to improve and create a better bond with an NPC through my actions and in turn gain gameplay benefits from doing so. It can add an extra layer to gameplay and make interacting with NPC's more worthwhile.
40	npcs had likable personalities and remembered player choices
41	the npcs felt like real people, rather than just a bland personality
42	UwU
43	In Read Dead Redemption 2, you interact with NPCs and they can cause mini cut scenes/unique dialogue that doesn't necessarily help you or hurt you within the game, but it just add to the feel that the world you are playing in is alive. The NPCs react to your actions and words and it really immerses you in the world. They also have their own lives and troubles and routines they do everyday which adds to the real world feel.
44	Fable 2 because they were funny
45	The NPC's in Undertale were very charming and oddly realistic. but the one with a character named sans stuck out as a funny and clever skeleton who enjoys puns and saves you at the beginning of the game.
46	The interaction between Mimir from GoW. His constant banter and regaling of Norse folklore kept me occupied and learning all the time
47	The npc gave an unexpected response to a chat option, which changed the course of the quest
48	Because they felt real, and had their own story, like a real person
49	Well written characters are timeless. Undertale is built on its incredibly strong character writing for exmple.
50	Far goth in Morrowind. He tells you to find his ring. Upon returning with it and handing it back he tells you that he will be hiding it. After waiting till nightime

	you can follow the NPC stealthily and find exactly where he hides his valuables - stealing it back should you so wish. The open nature of this quest brings the characters involved and the world alive substantially, leaving the player with their own moral dilemmas.
51	Generally any interactions with plot-centric NPCs with more fleshed out writing. A good example is Mass Effect 2, which allows players to (optionally) develop friendships with a diverse cast of characters. Star Wars: Knights of the Old Republic is another comparable example.
52	Voice acting, immersive storytelling, interesting storyline.
53	There was an old man in Pokémon Colosseum you started raving on the spot after choosing a dialogue option.
54	The NPCs felt real, they had character, they had emotions, they fought for what they loved, they.... died for what they loved. People would miss them, the landscape of the game changed now that they weren't there. I'm thinking, of course....about Halo: Reach. Remember Reach.
55	Support Conversations in Fire Emblem Awakening with the Character Owain. it captures his essence perfectly and develops his character throughout the 3 (or 4) conversations.
56	Dragon age origins in my opinion has the best NPCs. I re-play pretty frequently because each character in your party has unique interactions for quests and decisions you've made that feels really fresh and interesting. They feel like real people who aren't static bodies there to fill space
57	Furthering the narrative
58	Ellie from the Last of Us. The whole game is written in such a beautiful fashion that all the NPCs stand out. But by the end of the game, I have never felt such a realism and connection to a video game character.
59	Positive interactions are often the ones that are not remembered. I'd have to say most experiences with Ciri in Witcher 3 were really positive. This stands out as the NPC felt real and I cared for the character. The choices I made with that character determined her fate (which was the best ending) and made me feel great about my choices I had made.
60	NPCs in batman arkahm knight are used in some side missions as a side kick to combat they also allow someone for batman to bounce conversation off making those missions very valuable to flesh out the back story of the world

61	They were cool, I guess?
62	Either a good reaction to something I've done (Fallout 4), or just really good writing (Portal 2).
63	cant tell atm
64	They were well written and hid things from me until we grew closer through the game.
65	The way it stands out to me, is that it made me immersed in the world as a whole. It didn't make me think that I was in a video game, but rather in a fleshed out world.

(Figure 3.20)

4. Think about a negative interaction that you have experienced with NPCs in video games, describe why this stands out to you.

1	Not sure
2	Haven't had one
3	N/A
4	I’m not sure sorry.
5	In some games the NPC'S are more annoying than helpful.
6	Negative human computer interactions for me there are a few, it is when the character will interact with a computer such as Gears of War 5 where they find Niels AI was a little disappointing you did not get to interact with him as much as I would have hoped before it gets destroyed
7	Sometimes AI can be a bit clunky in certain games. With logic and what not. Along with some UI's (like divisions) which just has menus upon menus.
8	I haven't really had one. Sure, there's lag ect, but there's never been anything particularly bad in terms of physicality. In terms of in-medium, there are countless games with evil computers such as Portal and System Shock. Honestly though, GLaDOS is just doing her job (getting humans out of the lab, which is one of the things we're focusing on in real life) in a dangerous way, and SHODAN was hacked: her 'evil' is not of her own design, she's just trying to rebuild herself after being assaulted, which is again in my opinion pretty fair.

9	I guess games with bad controls are the best example of this. Going back to early 3D games with tank controls, or playing mobile games which require precise touch inputs tend to be pretty bad experiences.
10	Misunderstanding a dialogue option leading them to hate me forever over three words, despite the *actions* of my character.
11	When they allow you to speak to someone who you have just spoken to and they have the same convo again
12	N/A
13	Often in game menus from leveling up character traits as usually they are hidden behind menus and sub menus this makes it very easy to miss out skill trees or certain aspects of the game.
14	Starbound is a game that kind of failed to meet expectations. One of these reasons is probably because the NPCs feel forced and random. They were made to tell a bad story with little effort put into them, it's easy to describe most of them with one characteristic and that's all.
15	Bots in CSGO.
16	Elder Scrolls NPCs in general are a bit dopey. They sometimes just don't work at all.
17	N/A
18	Guild Wars 2- Scarlet. Generally poorly written character.
19	-
20	Any NPC that repeats themselves because it's just so obviously wrong
21	Fallout 4 has Preston who ask you consistently about doing another job for him, this gets boring very quickly
22	A negative interaction would be a case when it was completely avoidable (f. ex you get an item without any description or backstory) and a different way of interacting with the world would have gave the same result
23	Again with witcher 3, while talking to a character i actually liked, i disagreed with her actions. Unknowingly i was forced into killing this character, which displeased me.
24	If the NPC just says the same thing over and over it becomes repetitive and boring
25	I hate the bad guy from pokemon sun and moon. Very shallow. Didn't like her as she didn't have much of a personality.

26	Almost all NPCs in We happy few. The interactions (whether they were story characters, friendly non-story NPCs or enemy ones) were all predictable, they weren't there to tell me anything, I felt they were there just to fill the world with something. Empty interactions.
27	They are annoying and have impeded gameplay and made those games less enjoyable.
28	Not being clear as to the next step
29	Bad controls
30	Walking around the spaceship after a mission in Mass Effect, trying all NPCs to see if they have new dialog; being disappointed if it was the same old repeated lines again.
31	I can’t think of one, sorry
32	Companions in a game like Skyrim or Fallout that get caught on terrain, don't follow properly or don't teleport to you when stuck.
33	NPCS in Skyrim, some of the dialog wouldn't match the situation at all eg having a chill conversation with me after i murder the whole household. Takes you out of it.
34	Not sure what this question is asking
35	When they best me in combat and I have to listen to their monologue yet again. Also characters that only have two phrases and repeat it constantly.
36	Na
37	it stands out because it made me angry
38	Repetitive
39	Wooden and stock-like NPC'S seem to ruin my immersion in a game. The stereotypical "villager #5" style box that cycles through the same 4 lines of dialogue that the other 10 villagers seem to share. It's even worse when there's barely a variation in voice acting.
40	npcs didn't react appropriately to current situation (e.g. their best friend has just been murdered in front of them. "would you like some coffee?")
41	the npcs were bland and repetitive
42	???
43	As much as I love Skyrim, they did not do the best with their NPC dialogue. They had like 3 voice actors and you can always tell when they were repeated. The NPCs also had routines, but they were very simple and made

	the game feel very scripted. There are many mods that address this issue and do it very well.
44	Their answers were shit
45	In Monster Hunter World you interact with an NPC called the Handler and she never really dose anything other then get in trouble. it stands out to me because it always happens for no good reason
46	I can't think of a specific instance, but NPC's that advance the plot while you escort them, and get stuck on their pathing. Their dialogue continues or repeats until they move again, and sometimes you have to restart the quest to fix it.
47	The npc reacted badly to a previous choice in game which locked off a future questline
48	Because they were poorly written and boring
49	Any time an NPC mechanically screws you over, like suicidal NPCs in forced escort missions, or people getting stuck in doorays.
50	Any escort quest NPC - especially those found in World of Warcraft - chicken escort series comes to mind.
51	I find that negative interactions with NPCs are largely mechanical rather than narrative. For example, NPCs with poor combat AI.
52	Long text, boring, didn't even read through just went and killed the murlocs without caring why.
53	Replaying a chapter and skipping long stints of pointless dialogue
54	They're just there to shoehorn you to the next section. "Oh no team of super cool swat shooty people, escort this random woman who only has 1 animation across the entire city, whilst fighting off enemies. Watch out because she's stupid and will die for no reason, also she's faster than your walk but slower than your sprint! We just needed an extra mission, you'll never see this woman again, and nobody here has ever seen her before. She means nothing. Why are you here doing it? Meh, nobody cares. You paid £40 for the game..."
55	Lydia from Skyrim. her character feels so one dimentional, she has one purpose, to serve the player. and the voice acting sells the fact that lydia doesn't really want to do that. I'm not sure if this is what the VA and developer intended, but it seems that way to me.

56	Pretty much any game with crummy characters who just repeat things and who don't have any reaction to what you do. Skyrim comes to mind where you can become the arch mage of the guild and the NPCs are like "you should join the mages guild..."
57	Repeatability, not being able to mention the thing you want
58	Fi from the Legend of Zelda. Fells like over babying the entire game, ruins immersion by telling you to take breaks
59	Cannot remember the name of the NPC, however it was an NPC in Elder scroll online that wouldn't give me my quest due to dialogue bugging out and repeating the same thing. It broke my immersion and I had to restart my character to enable me to progress through the game.
60	i cant think of a specific one but times when characters constantly repeat the same lines of dialougue for seemingly no reason when they have said it 3 times in a row already is very frustraighting and can break immersion
61	The character literally kicked a dog!
62	NPCs get buggy and sometimes don't realize you've completed a quest, and it's frustrating.
63	idem
64	Nothing really stands out because they weren't compelling
65	It stands out as just disappointing, unfortunately. More effort and development time could've, and should've, been put into the effort. It broke the immersion of the world and adventure, ruining the experience as a whole.

(Figure 3.21)

5. How do you feel this negative experience could have been prevented?

1	Not sure
2	I didn't have one
3	N/A
4	.
5	Have better ai in the game.
6	A more interactive game play with the AI
7	I don't think I Have any ideas for that one, sorry.
8	Weird placement for this question, but OK.

9	I assume this question and the next one should have been the other way around? But yeah, better controls. Controls are super important, and if a game doesn't feel good to play, it can be frustrating no matter how enjoyable the content is.
10	Clear understanding of what a dialogue option entails and/or valuing of player action, if you have NPCs evaluating players.
11	Take away the feature to repeatedly have the same convo
12	N/A
13	This could be avoided easily with less menus and a few easy to understand and navigate menus
14	For Starbound, just removing the story and leaving the game as a sandbox would work. But if intent on keeping the story, flesh them out, explain why they're doing things or what their motives are.
15	Google's alphago is an example of how bots can be improved. Used in StarCraft 2 it beat the world's best player.
16	If Bethesda finished their games before releasing them
17	Always take a step back, take a deep breath and try again.
18	Not removing player agency with a forced cutscene of an otherwise/previously preventable NPC action in the name of furthering a plot that's only allowed to be furthered with brute force/poor writing.
19	-
20	More effort into their dialogue system
21	Have a mechanic that realises you aren’t doing the quest and the npcs to stop asking you the same question
22	With a different interaction with the game world
23	Could have made it more obvious to the fact the dialogue path i was choosing was leading me to a fight with the character.
24	Added dialogue
25	Giving her more personality being obsessed with one thing isn't a personality it's a trait. I also disliked her daughter.
26	I'm not a game designer, but I guess making the world a bit smaller and trying to make different characters with connection between themselves.
27	The ability to mute, skip or ignore NPC interactions.
28	Yes

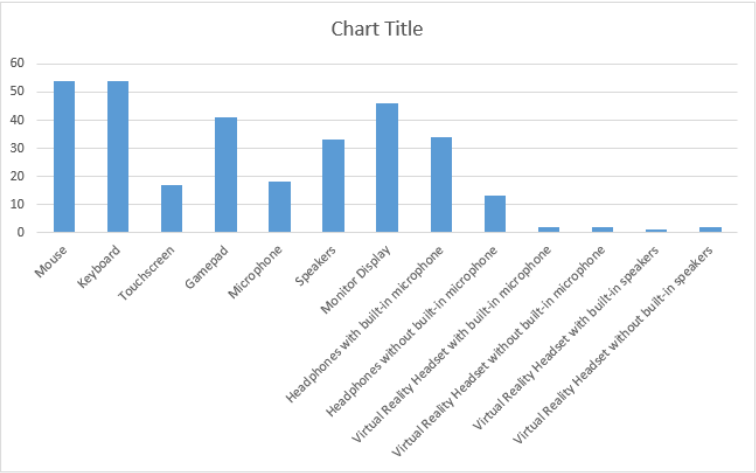
29	Control remapping
30	Make sure the NPC can't be talked to if nothing new to say (or make it obvious from a distance), or make sure they have a lot of different *interesting* things to say.
31	N/A
32	Improved AI or bug testing to fix these issues.
33	Probably because of the limitations of the time it came out, just add a load more emotional responses.
34	Not sure
35	Yes. Auto save as soon as the big boss speech finished so I don't have to listen to it 60 times.
36	Na
37	it could have been prevented if the people making the game had tested it for bugs before releasing it
38	Better scripts
39	Stop attempting to bulk out towns with bland NPC's. Either by reducing the amount of NPC's or dedicating the time to making more in depth. And unique characters. This however would increase work load exponentially
40	more reactions to possible situations for npcs, remembering player actions/choices
41	give the npcs some sort of variance in personality
42	???
43	Spending more time designing the NPCs to be more unique and hiring more voice actors.
44	Better script
45	If they gave her more of a common sense and let her defend her self.
46	I think with improved AI pathing, or more interesting dialogue banter the experience wouldn't have been so monotonous
47	An alternate option to completing the narrative was given
48	make characters more interesting
49	Don't implement this stuff unless the AI is sufficiently well developed not to make these mistakes, or the game accomodates for their behavior without inconveniencing the player.

50	By the numbers in that walk a few paces, enemies spawn - repeat. Combat tracking of this NPC is also terrible.
51	More time spent in development and quality control.
52	Voice acting. It's so important. Google has a pretty good speech synthetiser that uses neural networks to make the speech human-like. Just put the text through that thing and it will be more interesting.
53	Conciser dialogue
54	More time and effort into level design, but also creating a world wherein NPCs MEAN something to someone. Make them real living parts of the world.
55	Developing Lydia's character into more than a serveant
56	Text vs spoken text probably. Voice actors are expensive.
57	Better dialog choices
58	Tone down the number of player, NPC forced interactions. Added more personality.
59	Better beta/alpha testing. If the bug was found then that would not have happened.
60	its hard to say as obviously games have limited voice lines for characters but if AI was made smarter and was able to adapt the sentences in a way that mean the same but sound differently it would feel better for the plater
61	Huh? It was important to the story for them to be shown to be bad? Change the story maybe?
62	Better AI to notice the world, and better pathfinding.
63	idem
64	N/A
65	As I mentioned, more development time. However, there could have also been more research done, too. Studying human body and facial language, looking at social cues, tones of voice, mistakes and "human" attributes to speech and conversation, all these things could be researched, and based off of, in order to prevent the negative experience.

(Figure 3.22)

6. Please select which of the following peripherals you use when playing video games:

Mouse	54
Keyboard	54
Touchscreen	17
Gamepad	41
Microphone	18
Speakers	33
Monitor Display	46
Headphones with built-in microphone	34
Headphones without built-in microphone	13
Virtual Reality Headset with built-in microphone	2
Virtual Reality Headset without built-in microphone	2
Virtual Reality Headset with built-in speakers	1
Virtual Reality Headset without built-in speakers	2



(Figure 3.23)

7. Have you ever used your voice or written input in a video game to communicate with an NPC?

1	Dont think so
2	No
3	No
4	I don’t know what this means sorry.
5	I don't really know what you mean.
6	Yes
7	Yes
8	No.
9	I don't understand the question.
10	Yes
11	No
12	Yes
13	Yes
14	Not that I can recall.
15	No
16	Not in recent memory
17	No Sir
18	No.
19	No
20	No
21	No

22	Back in the 90s I guess, when graphical interface games were not as wide-spread as they are now
23	No.
24	No
25	Nintendogs
26	No
27	No
28	No
29	No
30	Yes.
31	No
32	No
33	Yes
34	No
35	I played an old DOS text based game in the 80's called Mountain. It would scold you if you typed cuss words at it and if you got mad and typed DIE it just responded "As you wish. You have died. Game over."
36	No
37	yes
38	No
39	Yes
40	yes
41	no
42	Yes
43	Yes
44	Yes
45	no
46	Yes
47	No
48	No, just putting what I love about mettatton in Undertale, but I don't think it counts
49	No
50	No

51	Only once as a child, I think the game was called "Hugo" or something similar (would have been late 90s). The player would type commands such as "open door". Haven't played many MUDs or text adventures.
52	Not yet.
53	No
54	Yes
55	yes, I've played a few text based games for my research back in A-Levels. I even made my own Text Based game.
56	Maybe
57	No
58	No
59	Yes
60	no
61	No
62	No
63	no
64	no
65	Not to directly communicate with an NPC.

(Figure 3.24)

8. If you responded with yes, please state: the name of the game, whether this was through typed or spoken input, and describe the experience. Otherwise, please explain why not.

1	Not sure
2	No
3	It's a feature I've never experienced
4	.
5	I don't know
6	Mass effect you can choose what your character says and when they say it
7	Cleverbot. It understood me and tried to come up with an answer. Most times it worked.
8	Because I've never played a game that allows for natural language.
9	I didn't understand the question.

10	Hey You Pikachu (N64) Spoken, Lifeline (PS2) Spoken, Nintendogs (DS) Spoken, Facade (PC) Written. All felt... clunky. You can 'see the seams'.
11	Cant think of a game that has had that function that ive played
12	SOCOM Games - Voice Chat
13	It was a text adventure I played in a video game museum it was done through typing into the computer I found the experience fun as even though the technology it was on was less powerfull than modern machines but I felt there were more possibilities
14	I've just not played games that allow you to do this. I don't feel its needed. It's another interesting mechanic, but ultimately is definitely not needed to tell a story. It's a gimmick in a way.
15	Haven't played a game with it in.
16	Its not something I actively avoid, but not something I've encountered before.
17	This scenario has fortunately never raised its ugly head!
18	Can't use what isn't there.
19	-
20	I just don't have a game like that
21	N/a
22	I don't remember the game, since I was under 10 when played with it. It was through typed input
23	Havent had the option to.
24	Never particularly interested me
25	I played nintendogs but it was on the ds so it wasn't all that good
26	I didn't play a game with such a mechanic.
27	I don't like the concept of using voice in games and would never have used that feature or turned it off.
28	Haven’t got that type of game
29	Key bindings faster than voice
30	HHttG. Typed. It was not a good experience. Not a very good parser. Also didn't give the player enough info about what to type or say, or even what direction to think in. Player quickly goes from elaborate sentences to basic verb-noun communication, as it's easier, more convenient and has higher success rate.
31	Just not something I’ve explored much

32	N/A
33	Does Okami count? Drawing to interact with NPCs
34	No
35	See above.
36	Just haven't had a gamr that uses it.
37	shroud of the avatar, typed, meh
38	Haven't met such a game.
39	Stories untold used the old "zork" style . Text based adventure game to create a unique experience. The first chapter where you interact with your sister through the text input screen was fun and unique.
40	almost all interactive fiction; typed input; nice, but sometimes obviously scripted
41	i haven't played a game that had that feature
42	Typed. A lot of the old Sierra adventure games had basically "ask about ____" or "talk about ____" things you could type out.
43	Some DS games you used your voice, like Nintendogs from back in the day. Some Zelda DS games also come to mind, but that was just blowing into the microphone. Both experiences felt a bit weird and out of place.
44	Does Typing of the Dead count?
45	i just haven't found a game that looks interesting with that feature
46	Some NPC's respond or give you achievements for typing specific emotes in Guild Wars 2.
47	Never played a game that required it
48	I just have never seen it
49	n/a
50	N/A
51	To date these game haven't interested me, though they would if the player had more complex agency.
52	I just have not came across a game that allowed it.
53	Nintendogs, slightly
54	Dude I wish I could remember the game. I know that this really isn't helpful to you, but I know that if I typed something in chat (and a bubble appeared above my head, it was that sort of game) then the NPC would react to certain key-words...

55	Heroes of Pryshore, Zork. Written input. it didn't particularly stand out to me as an amazing way of controlling a character, but I found it interesting nonetheless
56	I have a vague recollection of an old game i played with my dad when i was little where you could type things to NPCs.. maybe wizardry 8 or an earlier title in that series?
57	Never wanted to
58	Never had a game that required it
59	I believe the game was called Facade, it was written and the experience was incredibly funny.
60	again i cant think of any games that allow for this input
61	Again, I don't play games where it's even an option.
62	Didn't know they exist. There's one I remember seeing (you're on a spaceship with a computer as your only companion), but I never got around to playing it.
63	no game let me do that ?
64	unavailable
65	Honestly, the main reason I haven't is because I either didn't know the game had a feature to do so, or because I have never searched for games with this specific feature.

(Figure 3.25)

2. Research Participation Information Sheet

Section 01: Researcher Details

Researcher Luke Haslett
Contact – Email: Luke.Haslett@staffs.ac.uk Luke.Cage@hotmail.co.uk
Contact – Post: Room L312, Flaxman Building, Staffordshire University, Stoke-on-Trent, Staffordshire, ST4 2DE
Researcher Website https://lukehaslett.weebly.com
Institution Staffordshire University
Research Title Developing Narrative Design in Role-Playing Games with Natural Language Interaction for Non-Playable Characters.
Research Outline - Assess video game players to gauge interest in using Natural Language Interaction during a gameplay Role-Playing Game (RPG) experience. - Explore how video game players react to engaging Non-Playable Characters by using a Natural Language Interaction system in a RPG. - Evaluate the narrative design approach by finding the value of player intuition during gameplay. - Identify how immersive the players find the narrative design. - Determine if the modern standard of Natural Language Interaction technology is more efficient for game development.

Section 02: Participation Details

Participation involves playing through an interactive software prototype that

represents a video game experience where users will be able to test specific gameplay scenarios within the RPG genre and through a fictional theme.
The gameplay from the playtest session will be recorded for further evaluation relating to research.
The participant will not be identifiable through any personal details and have an alternative naming technique applied to the play session.
Participation is voluntary.
Written consent will be obtained from participants.
The participant may withdraw from the research at any time and for any reason by contacting the researcher outlined above.
Participants can find out more about the study and its results through the researcher website detailed above.
The opportunity to submit an email address will be completely **optional**. These are collected only as an incentive to be entered into a prize draw and will not be connected to the research itself.

Section 03: Information & Data

Staffordshire University is committed to protecting personal data and has taken steps to comply with the General Data Protection Regulation (GDPR) framework. Therefore, this research adheres to GDPR policy guidelines in the handling of information collection, usage, sharing and storage.
Any data related to the research participation will be treated with full confidentiality and, if published, every effort will be made to ensure the participant's data will not be identifiable as theirs.
Data will be stored electronically on a OneDrive storage system.
Participants will remain anonymous by submitting no identifiable personal details, and the project will use a participant identifier method for its results.
The uses of the project results are explained to the participant in this disclaimer, as will the participant identifier method, and data storage details.
The alternative naming convention will ensure the participant cannot be identified, and they will provide no identifiable personal details.
Non-identifiable data and results will be publicly available for research purposes only. Email addresses will not be accessible by any party beside the individual conducting this research.

Email addresses that are voluntarily submitted will be kept separate from the research results and will not be linked or used in conjunction with any research results whatsoever.
The data will be stored for 5 years on a OneDrive storage system, and deleted after that time.

Section 04: Declarations

The research will not involve members of vulnerable groups.
The research will not involve sensitive topics.
The research will not deliberately mislead participants in any way.
The research will not involve access to records of personal or confidential information, including genetic or other biological information, concerning identifiable individuals.
The research will not induce psychological stress, anxiety or humiliation, cause more than minimal pain, or involve intrusive interventions.

Section 05: Participation Consent

Please read the following statements and tick the relevant box (Yes/No).

Statement	Yes	No
I have read and understood the Research Participant Information Sheet.		
I have been given the opportunity to ask questions and have had them answered to my satisfaction.		
I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, and without this in any way affecting my treatment now or in the future.		
I understand that I can withdraw my data from the project up to the point of analysis without having to give an explanation.		

I understand that my participation with the study will be audio/screen recorded for further evaluation.		
I understand that data collected could be used for publication in scientific journals, presented in scientific forums, or used for teaching purposes, and I understand that all data will be presented anonymously.		
I agree that data collected will only be used for this project, although the data may also be audited for quality control purposes.		
I understand all data will be electronically stored safely on a password protected computer for 5 years before being destroyed.		
I agree to take part in this project.		

Date & Time	Participant Name	Participant Signature

3. Detailed Prototype Design and Implementation

A. Prototype Design Considerations Derived from the Pilot Study and Literature Review

Consideration Points – Game Narrative Design

- **RPG Framework**
  The experimental game genre must follow an RPG taxonomy and feature qualities commonly found within, including: a playable character pawn with movement & interaction mechanics, an explorable environment, established narratives, and NPC communication.

- **Dynamic NPC Roles:**
  Design NPCs to fulfil varied roles that offer advanced interactions that evolve with the player's actions and the game narrative, ensuring that their contributions are central to the storytelling and gameplay experience.

- **Enhanced NPC Communication and Personalities:**
  Develop NPCs with diverse personalities and communication styles to make them feel unique and engaging. Implement a flexible dialogue system that allows for more natural conversations and adapts responses based on player input, aiming to bridge the gap between game interactions and real-life conversational freedom.

- **Intelligent NPC Design and Narrative Integration:**
  NPCs should appear intelligent and capable of evolving with the player's progress, using adaptive information gating and reactive dialogue based on player achievements. This approach should be integrated into narrative communication, where NPCs are fully embedded within the game world, and ironic communication, which directly addresses the player, enhancing both the realism and the immersive quality of the game.

- **Multisensory Interaction Experience:**
  Focus on enhancing auditory and visual feedback during NPC interactions to simulate expected experiences. Optimising sight and sound should

significantly improve the perceived realism of NPC dialogue.

- **Authentic and Contextual NPC Interactions:**
  Ensure that NPC interactions reflect a genuine understanding of the game's world and the player's role within it. Move away from traditional UI-based dialogue systems to support a more immersive and authentic experience, where NPC interactions serve as a focal point in the game's design, promoting a more engaging player experience.

Consideration Points – Natural-Language Interaction

- **Optimisation of Interaction Technologies:**
  Address the technical challenges highlighted by players, such as poor input recognition and unsatisfactory NPC responses. This involves utilising modern NLI technology to ensure reliability, thus aligning better with player expectations and reducing frustration.

- **Leveraging Advanced Virtual Assistant Features:**
  Integrate features common to modern virtual assistants into the game's NLI systems. This should include natural language understanding, context awareness, and adaptive responses that mirror the sophistication seen in commercial virtual assistant technologies, enhancing the interactivity and depth of game narratives.

- **Enhancing Player Engagement with Written & Verbal Input:**
  Design the interaction capabilities to be more engaging and intuitive, encouraging players to use them more actively. This should involve clear indications of when input interaction can be beneficial and designing game scenarios where input commands add a tangible benefit to gameplay.

- **Expanding Narrative Experiences through NLI:**
  Utilise NLI to significantly enhance narrative experiences within the game. Ensure that voice interactions contribute meaningfully to the storyline, allowing players to influence and navigate the narrative through their spoken inputs. This should aim to create a deeper level of immersion and personal connection to the game's world and characters.

Consideration Points – Human-Computer Interaction

- **Adapting to the Evolving HCI Landscape:**
  Embrace a modern evolution of HCI by integrating the latest technology and innovations. This aligns with the general player openness to new forms of interaction, suggesting that the game should incorporate modern interaction systems to meet this expectation.

- **Utilising Advancements in Artificial Intelligence (AI) and Machine Learning:**
  Leverage advancements in AI and machine learning to develop more sophisticated game interaction systems. These technologies can enable more intuitive and complex NPC interactions, better input recognition systems, and adaptive gameplay mechanics that respond to players.

- **Meeting High Expectations for Interactivity:**
  Design interaction systems that not only meet but aim to surpass the levels of interactivity seen in modern video games. This includes creating highly responsive and intuitive interfaces that facilitate a seamless interaction experience.

- **Enhancing Input Interaction Systems:**
  Address the mixed perceptions of input interaction by developing more reliable and satisfying input-based interfaces. This involves tackling the technological limitations that currently hinder interaction in games and ensuring that these systems offer a genuine enhancement to the gameplay experience.

- **Maximising the Impact of HCI on Player Engagement:**
  Focus on HCI features that have been shown to significantly impact player engagement and satisfaction. This could involve designing interactive elements that are integral to the gameplay, such as puzzle-solving through input commands, which are designed to be more engaging and immersive.

B. Additional Technical Requirements and Service Integration

- **Hardware Comparison**

  During development, the reference hardware requirements identified in Table 5.01 were compared with contemporary consumer PC configurations using the Steam Hardware & Software Survey (Valve, 2024). The survey provides anonymised information concerning hardware and software configurations used by Steam customers and was used as a contextual comparison for the technical requirements of the prototype.

  At the time of consultation, 96.17% of Steam users operated either Windows 10 64-bit or Windows 11 64-bit. Regarding processor performance, 67.52% of Windows users reported processors operating at 2.7 GHz or above, while a further 23.73% used processors operating between 2.3 GHz and 2.69 GHz. For memory, 96.41% of users met or exceeded the 8 GB RAM reference requirement. At least 96.82% of surveyed users also reported graphics hardware compatible with DirectX 11 or DirectX 12.

  This comparison was used during prototype development to contextualise the reference specifications against hardware commonly reported by PC users at the time. It was not used as a measure of participant accessibility or as evidence of wider commercial suitability.

- **OpenAI Integration Plugin**

  The connection between Unreal Engine 4.27 and OpenAI was implemented using a community-developed plugin sourced from Mythen (2021). The plugin exposed the required API functionality through Unreal Engine Blueprint nodes, allowing the prototype to communicate with OpenAI without requiring a separate coded integration layer.

  The plugin provided functionality for authenticating the required API credentials, submitting asynchronous text requests to the OpenAI service, and receiving the resulting generated text within Unreal Engine. Returned responses could then be processed through Blueprint logic and passed to other systems within the prototype, including the conversation-history, user-interface, and text-to-speech systems.

This integration allowed the NLI functionality to remain within the Blueprint-based development workflow used throughout the prototype. The structure and content of the requests submitted through this connection, including contextual information and prompt construction, are described separately in Section 5.4.7.

- **Google Cloud Integration Plugin**

  Google Cloud Speech-to-Text and Text-to-Speech functionality was incorporated through the Google Speech Kit plugin available for Unreal Engine (Lunin, 2019). The plugin provided Blueprint functionality for authenticating access to Google Cloud services and exchanging data between the prototype and the relevant APIs.

  For spoken player input, locally captured audio could be submitted through the plugin to Google Cloud Speech-to-Text. The resulting transcription was returned to Unreal Engine as text and could subsequently enter the same conversational processing system used for written player input.

  For NPC output, generated text could be submitted to Google Cloud Text-to-Speech. The resulting audio was returned to the prototype and played as the NPC's spoken response while the corresponding generated text was displayed through the user interface.

  The use of the plugin therefore allowed written and spoken interaction to operate through a common text-based NLI structure while providing separate input and output pathways where speech was used.

C. Additional Game Overview and Environmental Design

- **Physical Environment**

  The physical environment of *Turing* used the standard gravity and collision systems available within Unreal Engine 4.27 as the basis for player movement and environmental interaction. However, some elements were deliberately restricted to maintain a controlled and navigable prototype environment. Most

environmental objects remained static, NPC collision was disabled where appropriate to prevent them obstructing player movement, and invisible barriers were used to prevent access to areas outside the intended playable space.

These restrictions were intended to reduce navigational interruptions and keep the available environment focused on the areas and interactions required for the experiment.

- **Visual Style and Atmosphere**
  The prototype used a simplified visual style appropriate to the development scope of the research artefact. Blockout-style environmental construction was combined with colour variation and environmental dressing to differentiate locations and provide sufficient visual context for exploration.

  The game presents a deliberately contrasting tone. The colony uses a relatively bright and approachable visual presentation, while its narrative context concerns isolation, abandonment, and deteriorating robotic inhabitants. NPCs generally communicate with the player in an approachable manner despite this background, creating a contrast between their conversational presentation and the condition of the colony.

- **Science-Fiction Setting**
  Turing is set within a futuristic science-fiction colony populated primarily by robotic NPCs. This setting provided a narrative explanation for the use of technologically advanced conversational systems and allowed generated dialogue to be incorporated into characters whose artificial nature was already established within the fiction.

- **Lighting**
  Outdoor areas primarily used directional lighting to represent daytime conditions, while indoor areas used local point-light sources to maintain visibility. Lighting was configured primarily to provide clear navigation and visual consistency across the spaces used during participant testing.

D. Additional Systems and Mechanics Considerations

- **Movement System**

  The prototype provides directional first-person movement, allowing the player to move forwards and backwards and strafe left and right through the environment. Camera movement is unrestricted, allowing participants to orient their view towards NPCs, interactive objects, and environmental features as required during exploration.

  A jump function was also included to provide familiar first-person traversal and to help players negotiate minor obstacles or collision geometry. Sprinting allowed players to increase their movement speed when traversing larger areas of the prototype. Neither jumping nor sprinting formed part of the experimental manipulation, but both were retained as supporting traversal functions.

- **NPC Naming and Supporting Design**

  NPC naming conventions were developed partly to support spoken natural-language interaction. Many character names were drawn from the NATO phonetic alphabet and Greek alphabet because these provide relatively distinct and recognisable spoken terms that could be used during conversations involving Speech-to-Text processing.

  A further group of NPCs located within the Staffordshire University Turing Campus area were given names based on members of university staff. These names provided an additional thematic connection between the fictional environment and the location that inspired this area of the prototype.

  Maintenance Bots also used environmental animations associated with repair and maintenance activities. These behaviours supported the presentation of the colony as a functioning but deteriorating environment, despite these NPCs having more restricted conversational capabilities than Information and Quest Bots.

NATO Alphabet	Greek Alphabet	Lecturers

Bravo	Alpha	Chris
Charlie	Beta	Dave
Delta	←	Deej
Echo	Epsilon	Esther
Foxtrot	Gamma	Jarrad
Golf	Kappa	Kieran
Hotel	Lambda	Luke
India	Omicron	Nicola
Juliette	Sigma	Sharon
Kilo	Tau	Stu
Lima	Theta	
Mike	Zeta	
November		
Oscar		
Quebec		
Romeo		
Sierra		
Uniform		
Victor		
Whiskey		

(Table 5.02: List of NPC names)

- **Environmental Interaction Systems**

  In addition to natural-language communication with NPCs, *Turing* includes conventional environmental interaction systems used to support exploration and task completion.

  Collectable objects are positioned throughout the environment and can be acquired where required by NPC-driven tasks. Several tasks use these objects as part of fetch-style interactions in which information obtained through NPC conversation directs the player towards an item or location.

  Interactive monitors are used for several task-specific mechanics. Activating one of these monitors temporarily suspends conventional first-person movement and changes the player's viewpoint to the perspective required by

the associated activity. Once the activity is completed or exited, control returns to the standard first-person perspective.

Doors provide environmental access throughout the prototype. Some doors can be opened directly through player interaction, while others are associated with progression requirements such as possession of a keycard or completion of an NPC-related task. These systems allow access to particular locations to be connected with exploration and task progression.

Keycards represent a further form of progression-based environmental interaction and are described separately in the following subsection.

- **Keycard Progression**
  Three keycards were implemented within the prototype: blue, red, and yellow.

  The blue keycard is encountered during the introductory section of the game. It is required to unlock the Administration Building and gain access to the wider explorable environment. The card is obtained following interaction with the colony administrator and introduces the player to the use of keycards as progression requirements.

  The red keycard is associated with the Staffordshire University Turing Campus building. A nearby NPC informs the player that the access card has been lost, after which the player can locate it within the surrounding area and use it to enter the building.

  The yellow keycard forms part of a fetch-style task initiated by an NPC in the administration district. Rather than unlocking an additional major area, this task requires the player to speak with other NPCs to gather information concerning the card's location before retrieving it.

  Together, these keycards provide three variations of the same underlying progression mechanic: introductory gating, environmental exploration, and conversation-supported item retrieval.

- **Assembly Workshop Task**

  The Assembly Workshop contains a task in which the player is asked to guide a robot through a maze. On entering the workshop, the player encounters an NPC positioned at a desk. This NPC introduces the task, explains that assistance is required, and directs the player towards an interactive monitor.

  Interacting with the monitor temporarily removes control from the standard first-person perspective and changes the camera to a top-down view of a connected room containing the maze. A robot is positioned at one side of the maze, with an exit located elsewhere within the space.

  The player directs the robot using movement commands including forwards, backwards, left, and right. Additional commands allow the robot to turn around, while the player can also exit the activity before completion if required.

  The task is completed when the robot reaches the maze exit. At this point, the task-specific camera is removed and control returns to the standard first-person player perspective.

- **Calibration Lab Task**

  The Calibration Lab contains a task based around colour identification. On entering the laboratory, the player encounters an NPC who introduces the activity, requests assistance, and directs the player towards an interactive monitor.

  Activating the monitor temporarily changes the camera from the standard first-person perspective to a task-specific view focused on a wall-mounted display and an adjacent robot. The robot provides instructions and feedback while the task is active.

  During the activity, the display presents a series of colour words. Each word names a colour but can be rendered in a different text colour and displayed against another background colour. The player is required to identify the colour of the text itself rather than the colour named by the word or the

background colour.

The displayed combination changes periodically during the activity. The adjacent NPC confirms whether the player's response is correct. The task is completed when the player provides five consecutive correct responses, at which point the task-specific view is closed and control returns to the standard first-person player perspective.

- **Student Essay Task**
  The Student Essay task takes place within the Staffordshire University Turing Campus building. On entering the relevant area, the player encounters an NPC positioned behind a desk who explains that three student essays have been lost and asks for assistance in recovering them.

  The three essays are placed in different rooms throughout the building. The player must navigate the available spaces, locate each essay, and return the missing items as required by the task.

  Additional NPCs located within the building can provide clues or directions concerning the locations of the essays. These interactions provide an alternative source of information alongside direct environmental exploration and allow the player to use conversation to assist with locating the required objects.

- **Translation Disc Task**
  The Translation Disc task takes place near the administration district and begins when the player encounters two robots engaged in conversation. One robot communicates only in French, creating a language barrier for the player.

  The second, English-speaking robot explains that a translation disc used to convert the French-speaking robot's dialogue into English has been lost. The player is therefore asked to locate the missing disc within the surrounding environment.

  The player explores the area and retrieves the required item. Once the

translation disc is returned, the translation function becomes available and the French-speaking robot's dialogue can subsequently be understood in English.

- **Shopping District Task**
  The Shopping District task takes place across three stores: the Virtual Vinyl Vault, Quantum Coffee Company, and Futuristic Fashion Hub.

  On entering the district, the player encounters an overseeing NPC who explains that a delivery error has resulted in each store receiving an incorrect item. The Virtual Vinyl Vault has received a clothing itinerary, the Quantum Coffee Company has received a digital music code, and the Futuristic Fashion Hub has received a coffee recipe.

  The player must speak with the NPC operating each shop to establish what that store originally ordered and what it has incorrectly received. After gathering the necessary information, the player retrieves the relevant items and delivers them to their intended destinations.

  Completion therefore depends on combining information obtained from several NPC conversations with item retrieval and delivery.

- **Cosmic Market Exchange Task**
  The Cosmic Market Exchange is populated by a series of market stands, each operated by an NPC vendor possessing a particular item. On entering the market, the player encounters an NPC who introduces the task and identifies a specific item that must be obtained.

  The player is provided with an initial item to begin the trading sequence. Each vendor is willing to exchange the item they possess for another item that they require. The player must therefore interact with the vendors to establish what each NPC wants and determine how the available items can be exchanged.

  Through a sequence of trades, the player can eventually obtain the item requested by the entrance NPC. Returning this item completes the task.

- **Maintenance Bot Task**

  Maintenance Bots are positioned throughout the playable areas of *Turing* and perform basic maintenance-related activities within the environment. Unlike Information Bots and Quest Bots, these NPCs do not use the full NLI system and instead provide limited scripted responses characterised by disrupted or incomplete speech patterns.

  The associated task is introduced at a stand near the Cosmic Market Exchange. An NPC asks the player to locate and reboot all 25 maintenance bots distributed across the colony.

  The player uses the Reboot Module on each maintenance bot encountered. Progress is tracked through a large environmental display positioned above the task stand, which updates to show how many robots have been rebooted and how many remain.

  The task is completed once all 25 maintenance bots have been located and rebooted.

- **Inventory System**

  The inventory system allows the player to collect items required by several tasks and transport them to the relevant location or NPC. Rather than using a conventional inventory menu, the system is deliberately limited to a single held item.

  The player can therefore carry only one task-related object at a time. This simplified implementation avoids the need for a larger inventory-management interface and keeps the player's current item immediately identifiable.

  The held object is represented visually during gameplay rather than being stored only within an off-screen interface. This allows the player to remain aware of the item currently being carried while continuing to navigate the environment and interact with NPCs.

  The prototype also does not include a persistent quest-tracking interface.

Information concerning active tasks, required objects, and destinations is instead communicated primarily through NPC dialogue and environmental information.

E. Additional Narrative Considerations

- **Game World**

  The Turing colony is organised into four principal areas, each representing a different function within the abandoned settlement.

  The Administration District contains the introductory tutorial and acts as the player's initial point of entry. The opening sequence takes place within the Administration Building before the player gains access to the wider colony. The area establishes the maintenance-worker role, introduces interaction with robots, and provides access to several subsequent tasks.

  The Staffordshire University Turing Campus represents the colony's intended educational infrastructure. The area draws thematically on Staffordshire University's Games Institute and contains academic environments, robotic characters, and a task involving the recovery of missing student work.

  The Shopping District represents facilities intended to serve the colony's former human population. It contains several fictional businesses and associated NPCs, including the Virtual Vinyl Vault, Quantum Coffee Company, and Futuristic Fashion Hub.

  The Cosmic Market Exchange provides a separate market environment populated by robot vendors. Its layout supports a trading activity in which the player communicates with different vendors to determine the sequence of items required to complete the task.

  More detailed spatial layouts, environmental construction, and screenshots of these areas are documented in the level-design appendix.

F. Detailed Level Design Documentation

- **Tutorial**

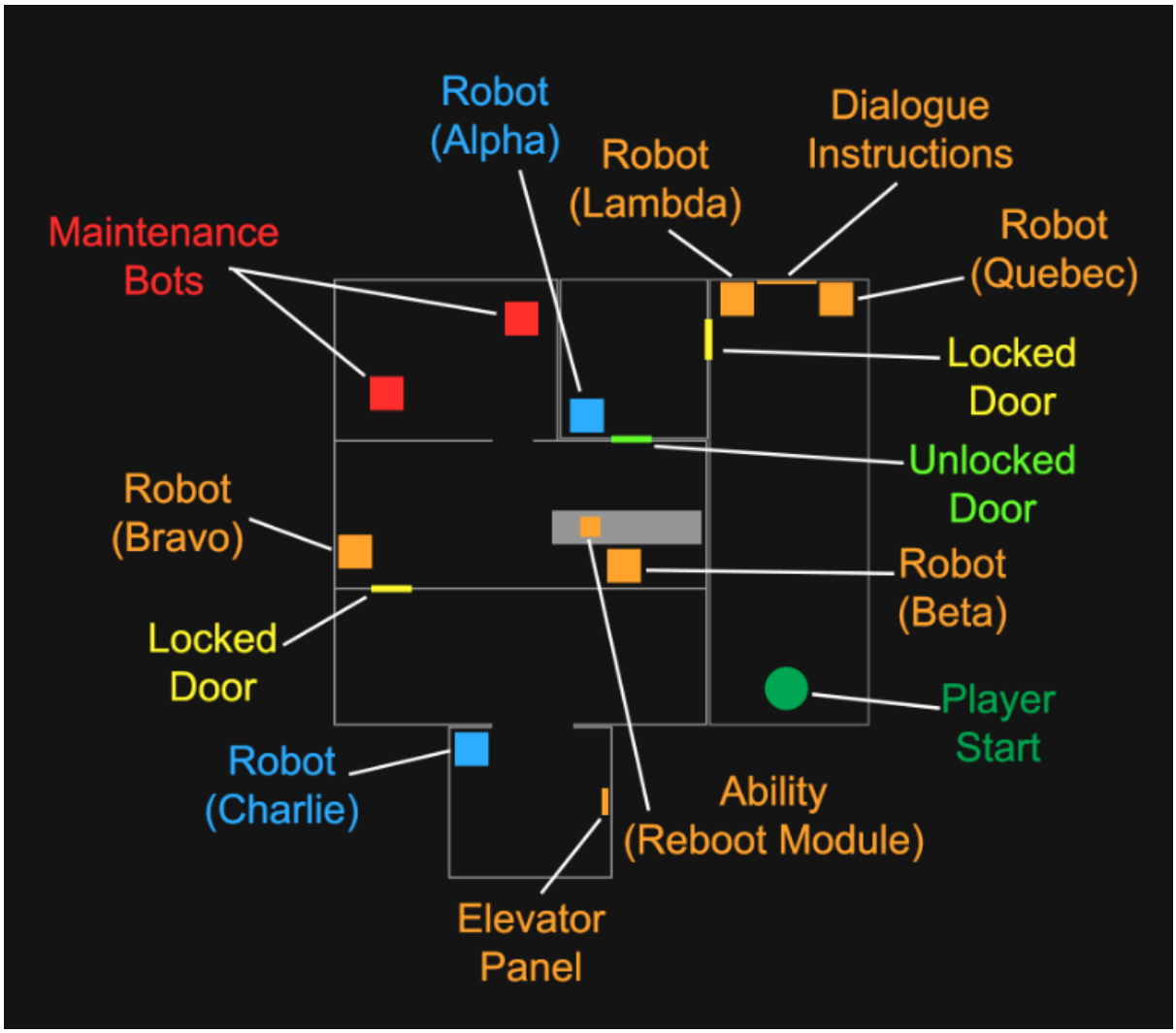
  The tutorial section is carefully designed to introduce players to the core interaction mechanisms, set within a narrative-rich environment that establishes the thematic tone for the rest of the game. The level begins in a dilapidated hallway that visually and audibly sets the stage for the colony's state of disrepair. This corridor is decorated with fallen ornaments, a flickering light that breaks, and posters depicting the colony’s origins. A malfunctioning speaker system can also be heard that delivers a fragmented welcoming message about the Turing colony. These elements not only enhance the atmospheric setting but also subtly communicate the underlying theme of decay and neglect.

  At the end of the hallway, instructions on how to interact with robots are displayed on the wall, preparing the player for their first encounters with two robots named Lambda and Quebec. These robots are stationed on platforms and equipped with pre-recorded messages instead of the wider conversational freedom for robots that follow. Lambda and Quebec exist to allow the player to practice opening dialogue interactions and the door-opening mechanic. Following successful interactions with these robots, the nearby door is unlocked and the player can open it, which leads to a small room containing another robot named Alpha.

  Alpha has wider conversational ability and provides a more personalised welcome that directs the player to proceed to the next room to meet Beta, who is positioned behind a reception desk. This larger room serves multiple functions: it contains another locked door with a robot named Bravo standing beside it, a meeting room with two maintenance bots, and a glass window providing a glimpse into an adjacent room. Beta introduces the player to the broader issues affecting the colony, reinforcing the narrative drive of the game and providing the player with a Reboot Module from her desk. This device is crucial for the player's interaction with malfunctioning robots like Bravo, whom Beta instructs the player to reboot as a practical exercise. Successful rebooting unlocks the door to the next area.

This subsequent space contains an elevator and a robot named Charlie, who instructs the player on interacting with an elevator panel. This interaction triggers the descent of the elevator, revealing a scenic view of the colony through the windows and visually indicating the expansive nature of the game world for players to explore.

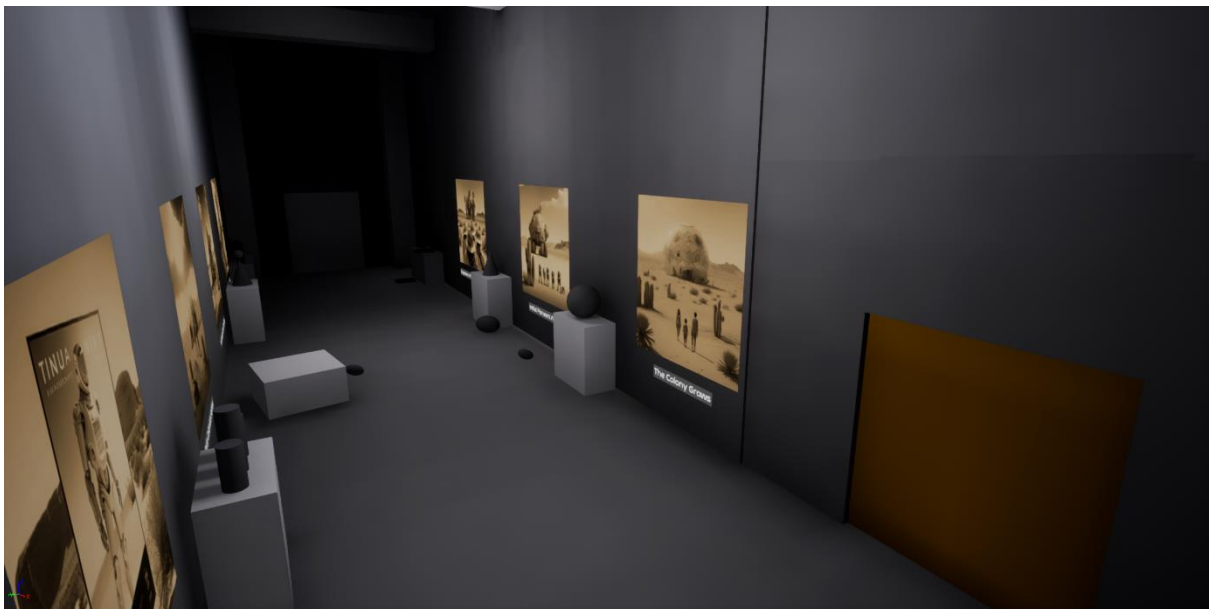
Figure 5.005 shows this starting tutorial section in detail regarding the level design layout, whilst Figures 5.005-5.016 show screenshots from the live version in the experimental game.



(Figure 5.005: Level layout of the tutorial section)



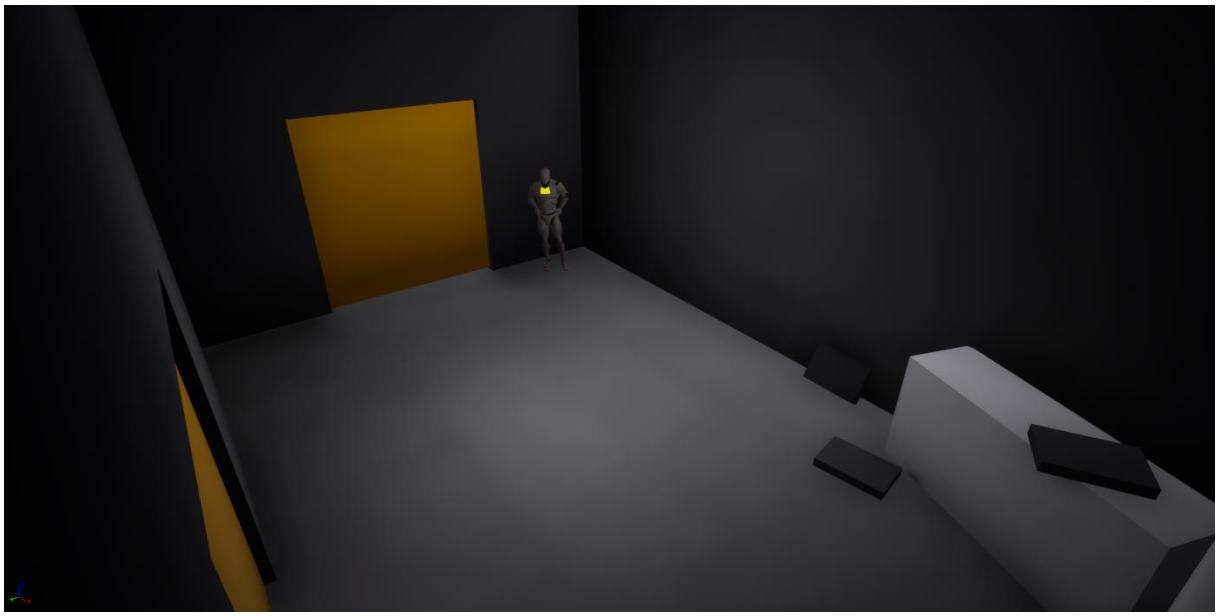
(Figure 5.006: Room 01 – North-facing)



(Figure 5.007: Room 01 – South-facing)



(Figure 5.008: Room 01 – Lambda & Quebec)



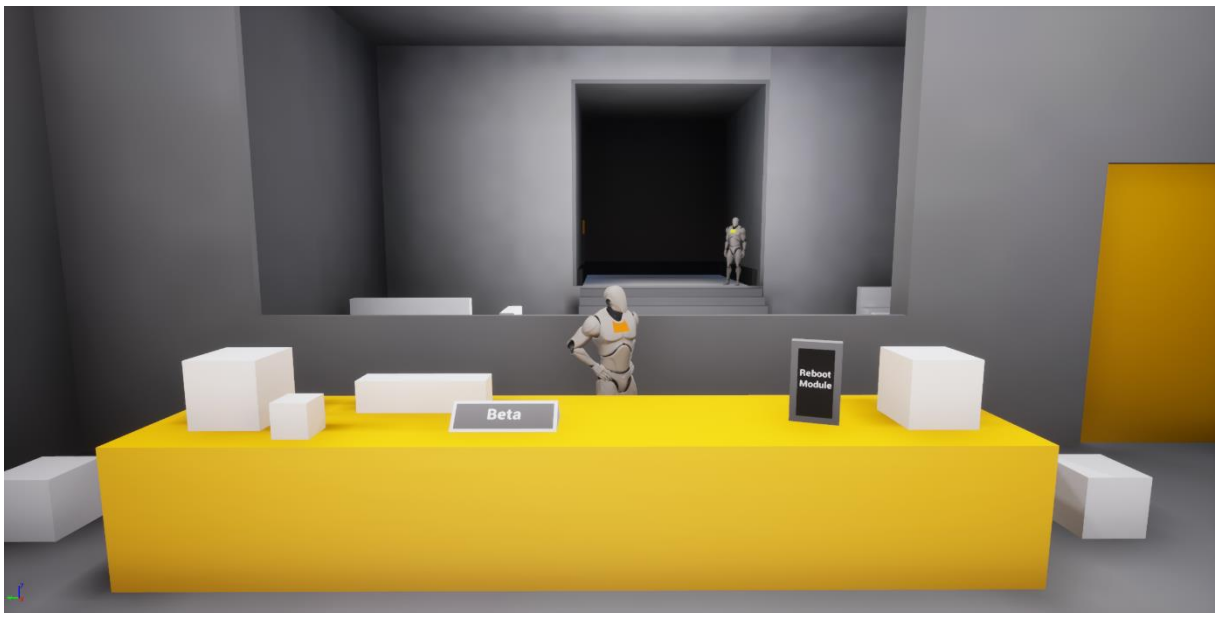
(Figure 5.009: Room 02 – Alpha)



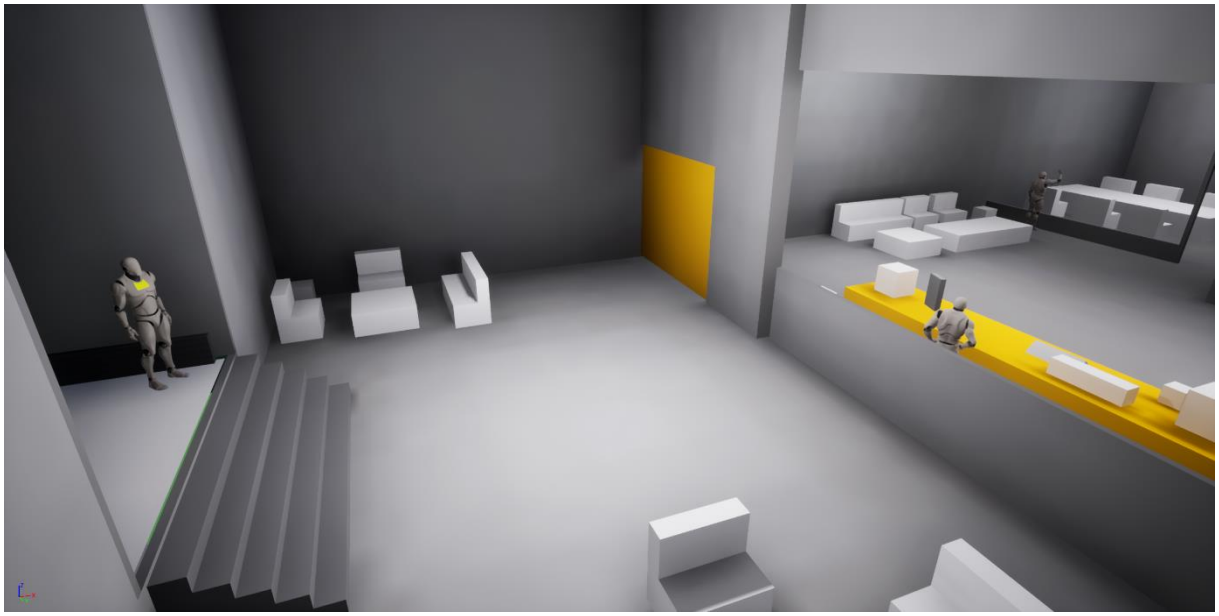
(Figure 5.010: Room 03 – Beta, Reboot Module, and Bravo)



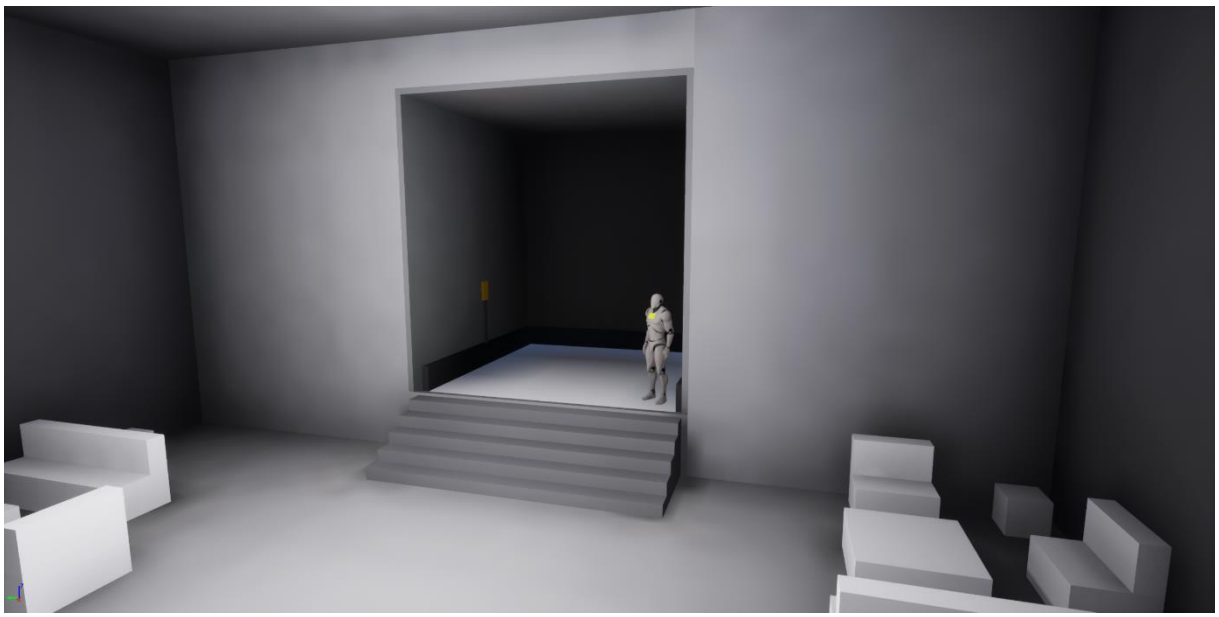
(Figure 5.011: Room 03 – Beta and Maintenance Bots)



(Figure 5.012: Room 03 – Beta and Reboot Module)



(Figure 5.013: Room 04 – Charlie)



(Figure 5.014: Room 04 – Charlie and Elevator)



(Figure 5.015: Elevator Descending View)



(Figure 5.016: Elevator Descending View)

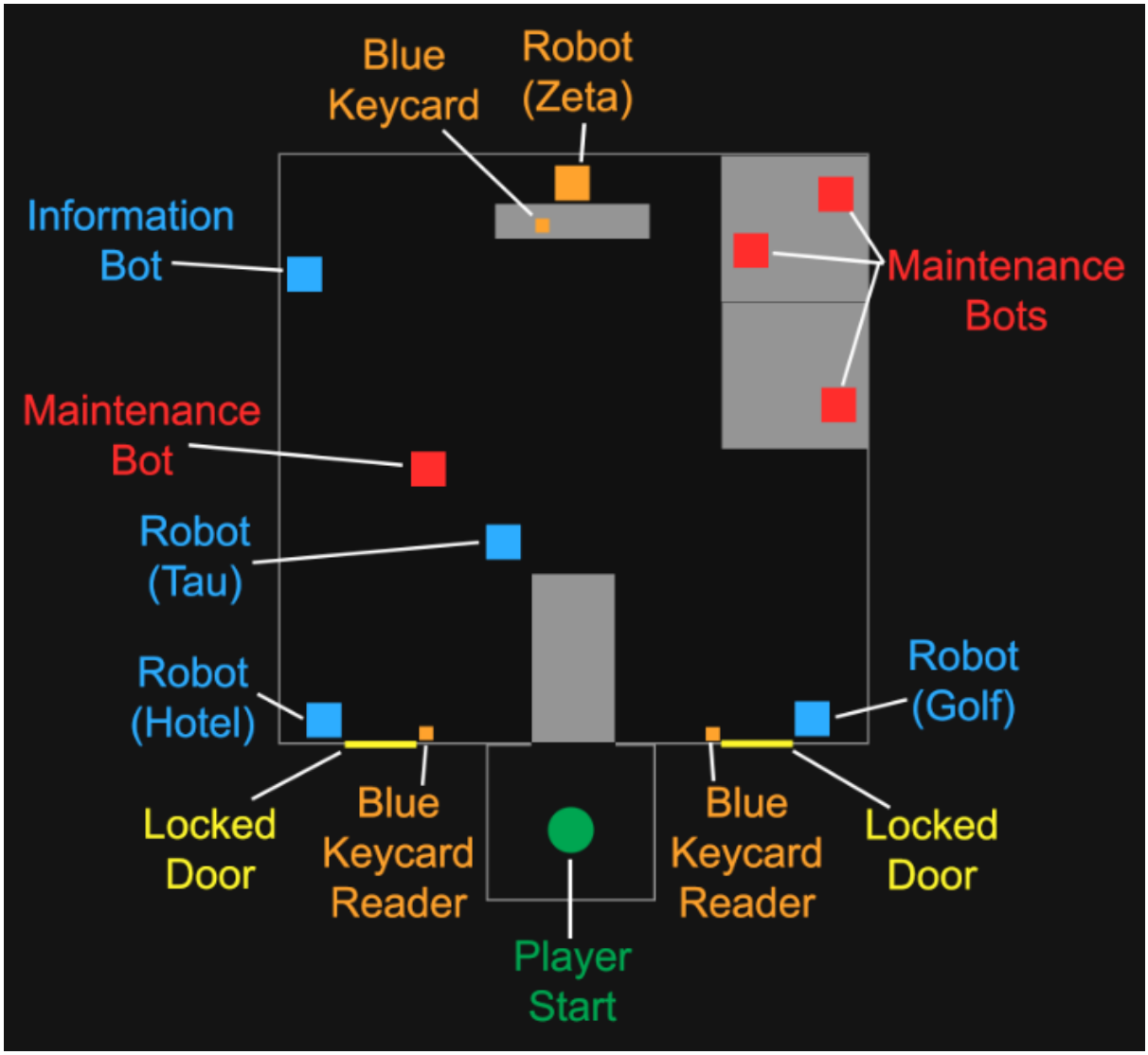
Upon reaching the ground floor, the environment transitions into a brighter, more populated area filled with seating arrangements, various robots performing different functions, and two locked doors guarded by robots named Golf and Hotel.

If the player speaks to Golf or Hotel first, they tell the player the doors will remain locked until the player has spoken to Zeta and received the keycard that unlocks them. Interaction with Zeta, another welcoming robot behind a reception desk, is necessary to obtain a blue keycard that teaches the player about the inventory system. Using the keycard on the doors allows the player to venture outside, and removes the keycard from the player's inventory, marking the completion of the tutorial phase. Zeta also suggests that the player can start their investigation of the colony by visiting the building across the road, which helps give the player a sense of direction for exploring the open world map.

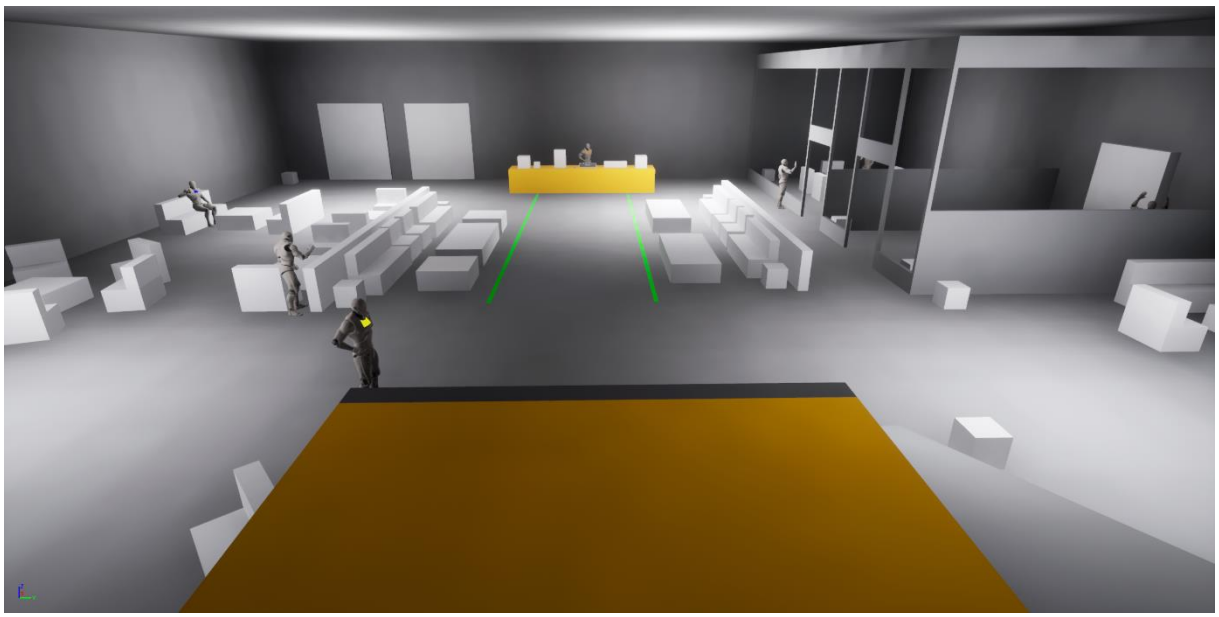
Another robot in this room is Tau, who stands near the bottom of the elevator and directs the player to speak with Zeta. There is also an information bot sat in the corner of the room that reminds the player how to bring up the user interface for hot keyed keyboard interactions.

Figure 5.017 shows this ground floor section in detail with a level design

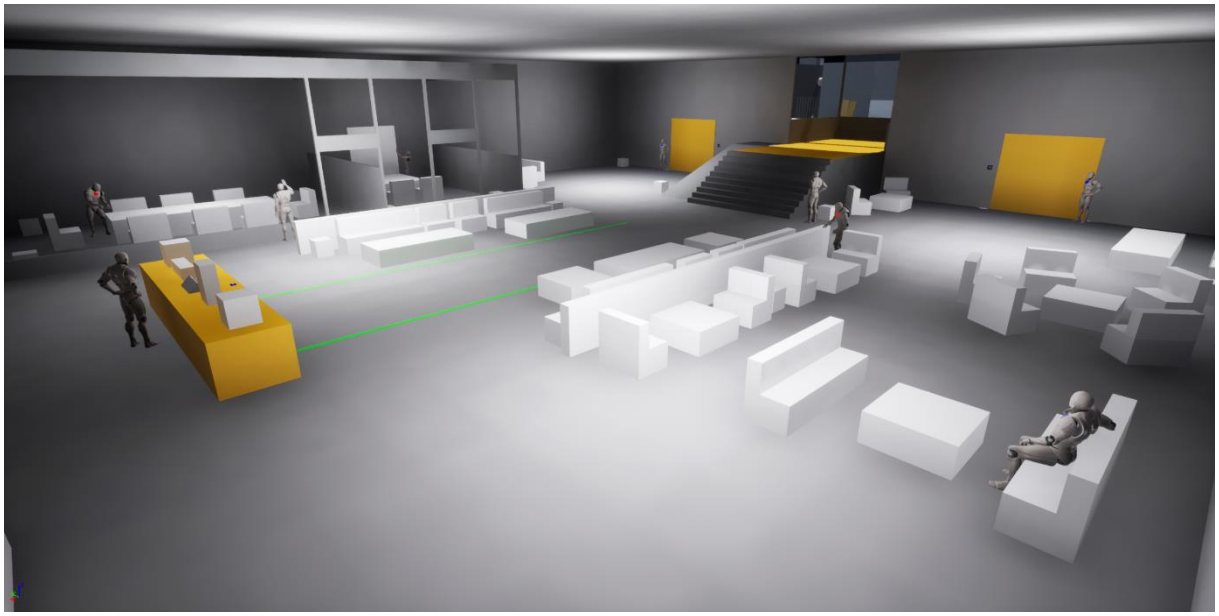
layout, whilst Figures 5.018-5.021 show screenshots from the live version in the experimental game.



(Figure 5.017: Level layout of the Administration Building ground floor)



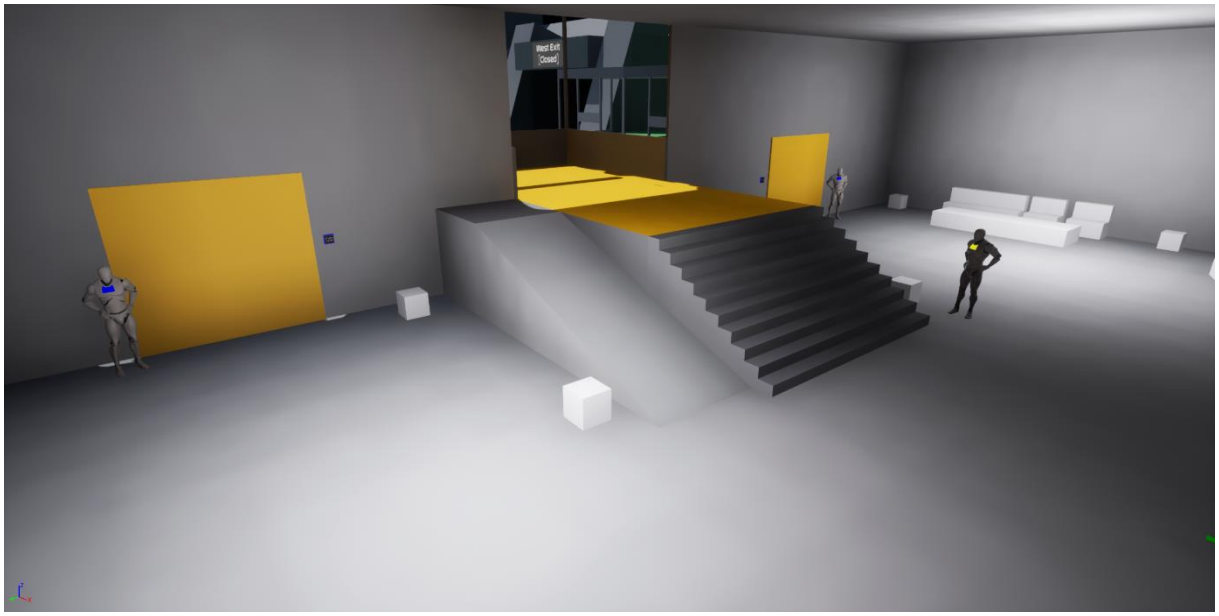
(Figure 5.018: Administration Building, ground level – North-facing)



(Figure 5.019: Administration Building, ground level – Southeast-facing)



(Figure 5.020: Zeta and Blue Keycard)



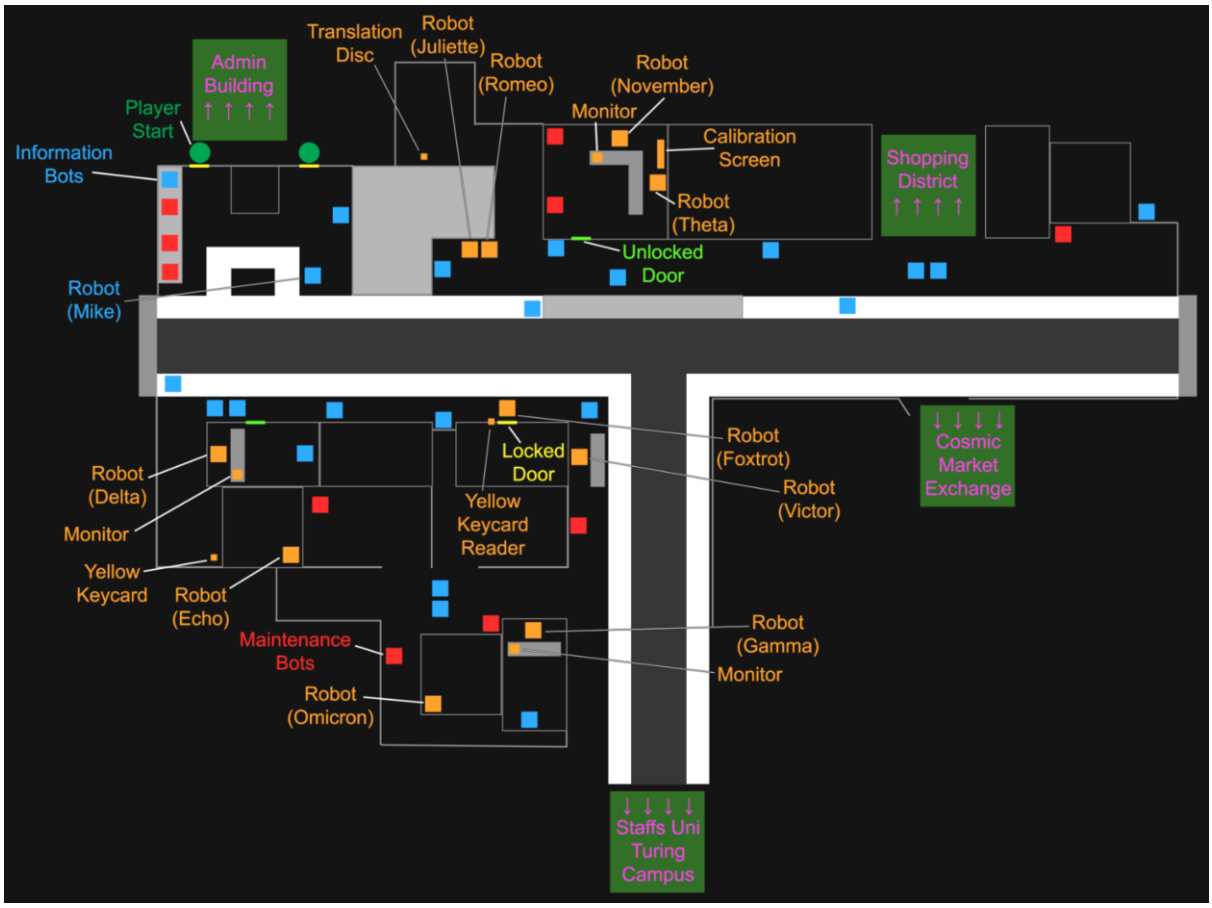
(Figure 5.021: Golf, Hotel, Tau, Keycard Readers, Elevator, and exit doors)

This level is designed not only to onboard the player with the necessary gameplay mechanics but also to immerse them in the game's narrative context, emphasising exploration, interaction, and problem-solving within a deteriorating robotic colony. Through detailed environmental storytelling and structured interactive tutorials, the player is effectively prepared to engage with the broader challenges and adventures that lie ahead in the game.

- **Administration District**

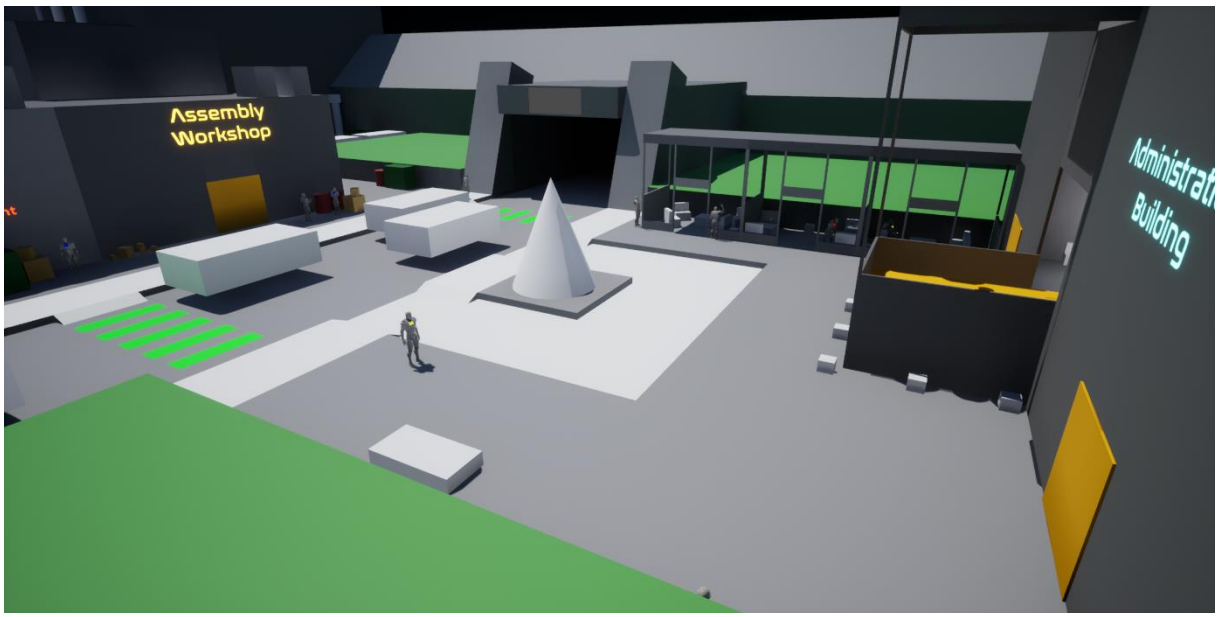
  Upon exiting the Administration Building, the player transitions into the next

area of the open-world exploration within the Administration District. This district serves as an introductory hub, populated with a variety of robotic characters each designed to gradually expand the player's interaction with the game world. Figure 5.022 shows the level design layout of the district, sans the building interiors.

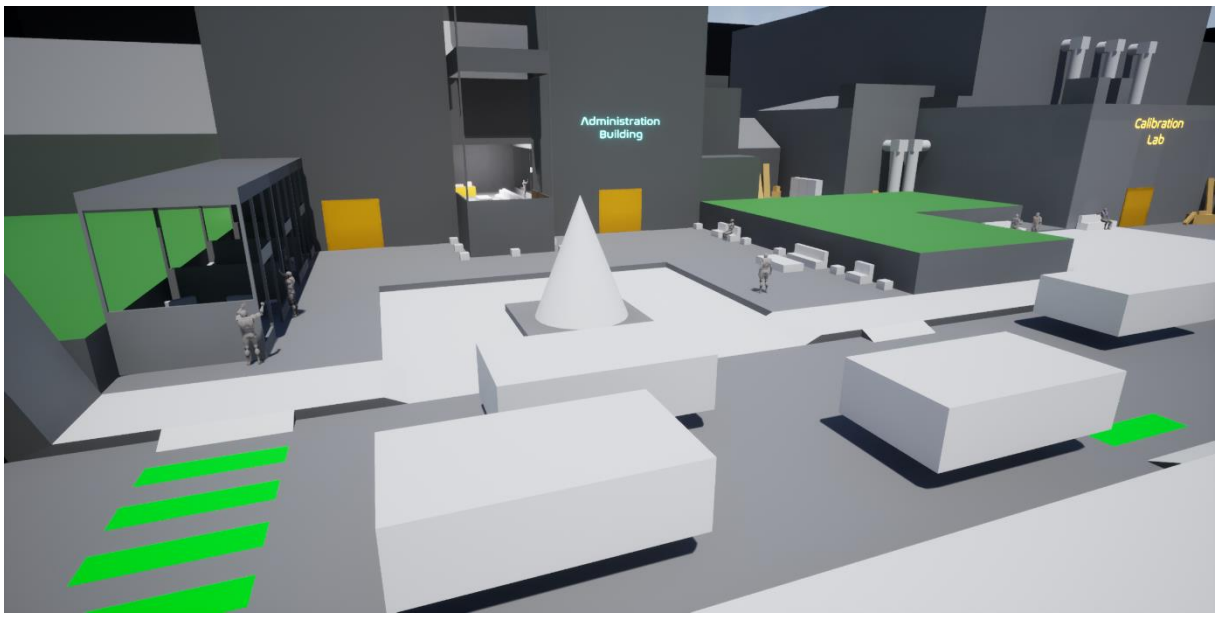


(Figure 5.022: Level layout for outdoor area of Administration District)

As the player steps into the courtyard of the Administration Building, they encounter multiple robots, including maintenance bots and information bots. One of the information bots mentions seeing a Translation Disc in the alley beside the Administration Building, providing an immediate point of interest for exploration. Another distinct character in this area is an information bot named Mike, who offers insights into the visual cues of the robots, such as different coloured chest plates that signify the types of conversations players can expect, enhancing the player's understanding of the game's communication mechanics. Figures 5.023-5.024 show screenshots of the courtyard.

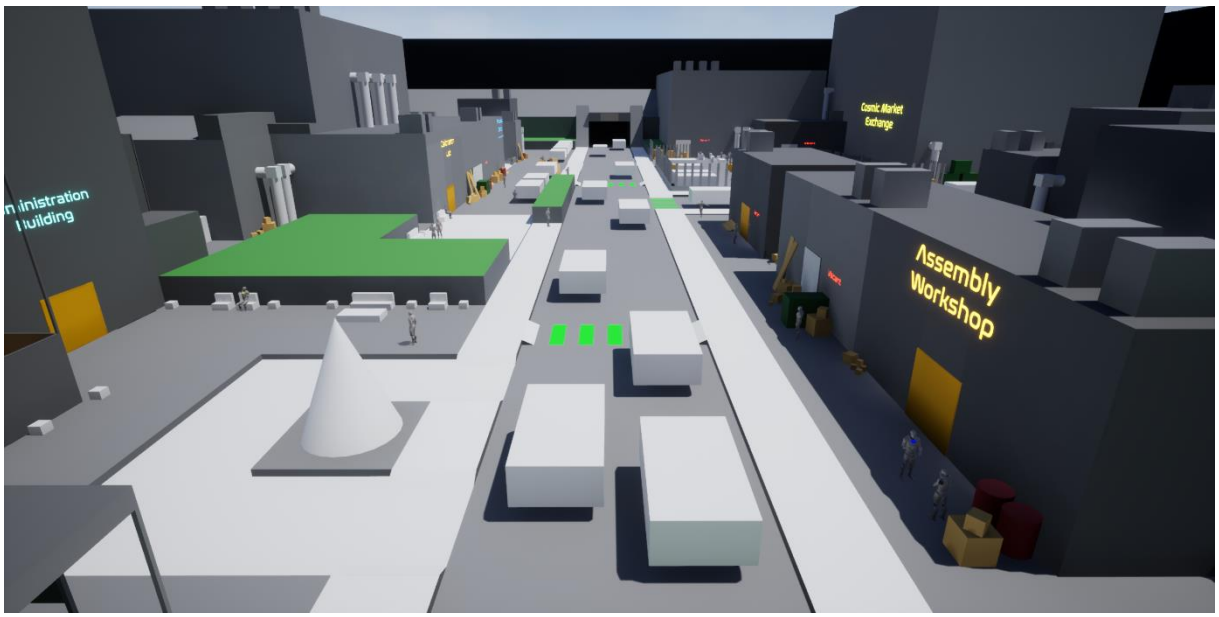


(Figure 5.023: Administration Building Courtyard – Southwest-facing)



(Figure 5.024: Administration Building Courtyard – Northeast-facing)

The layout of the Administration District includes a road heading east, lined by walkways and bordered by closed tunnels, contributing to a sense of containment and curiosity about the wider colony. Stationary vehicles along the road emphasise the abandonment and static nature of the colony. Directly across from the Administration Building, an Assembly Workshop is situated, providing a focal point for further player engagement. Figure 5.025 shows the main road through Turing.



(Figure 5.025: Main road – East-facing)

In front of the Assembly Workshop, two robots are engaged in a nostalgic conversation about the past human presence in the colony, adding depth to the narrative backdrop. Nearby, another robot looks sadly towards the closed tunnel exit, lamenting the unfinished state of the colony and hinting at the yellow keycard located in the alley next to the Workshop. These interactions not only enhance the narrative but also guide the player towards specific points of interest. Figure 5.026 shows the first Assembly Workshop.



(Figure 5.026: Assembly Workshop and West Exit)

Inside the Assembly Workshop, an information bot informs the player of the facility's incapability to build new robots due to missing inter-communication

modules, hinting at potential tasks. A robot named Delta stationed behind a desk inside the Workshop assigns the player a task to guide another robot out of an adjacent room, integrating the player further into the maintenance and operational challenges of the colony. Figure 5.027-5.028 show the interior rooms of the Assembly Workshop and adjoining maze.



(Figure 5.027: Delta and Maze Monitor)



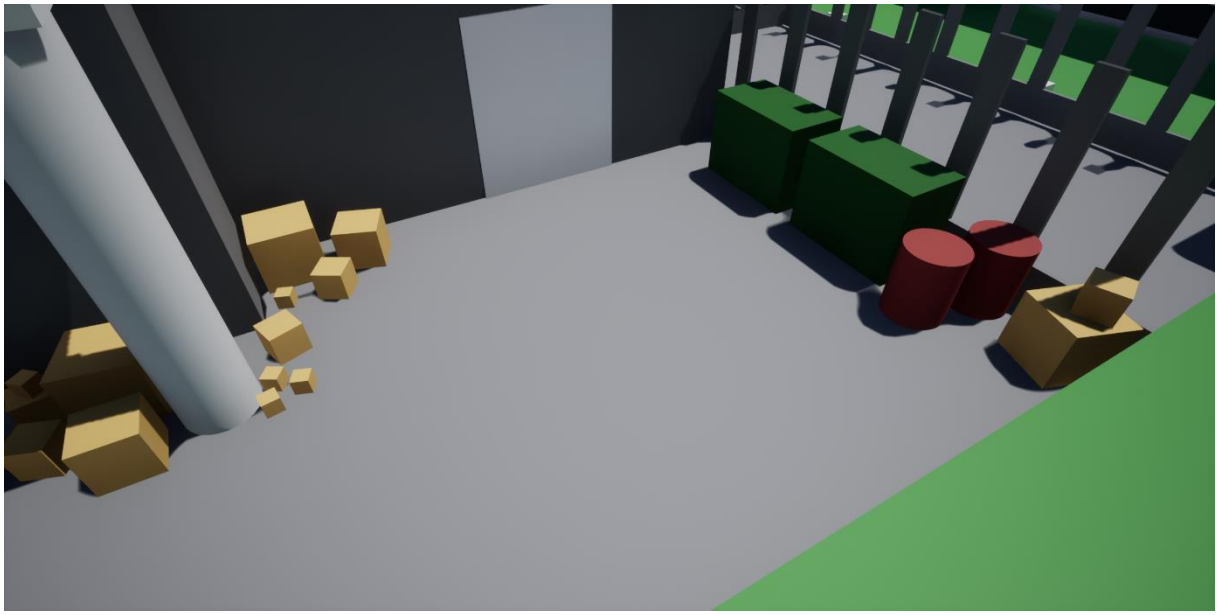
(Figure 5.028: Echo and Maze)

Exploration around the Assembly Workshop reveals a hidden yellow keycard in the side alley, essential for another task down the road. The district also includes vacant buildings, one of which has an information bot in front expressing regret over the unfinished state of the colony. Another robot

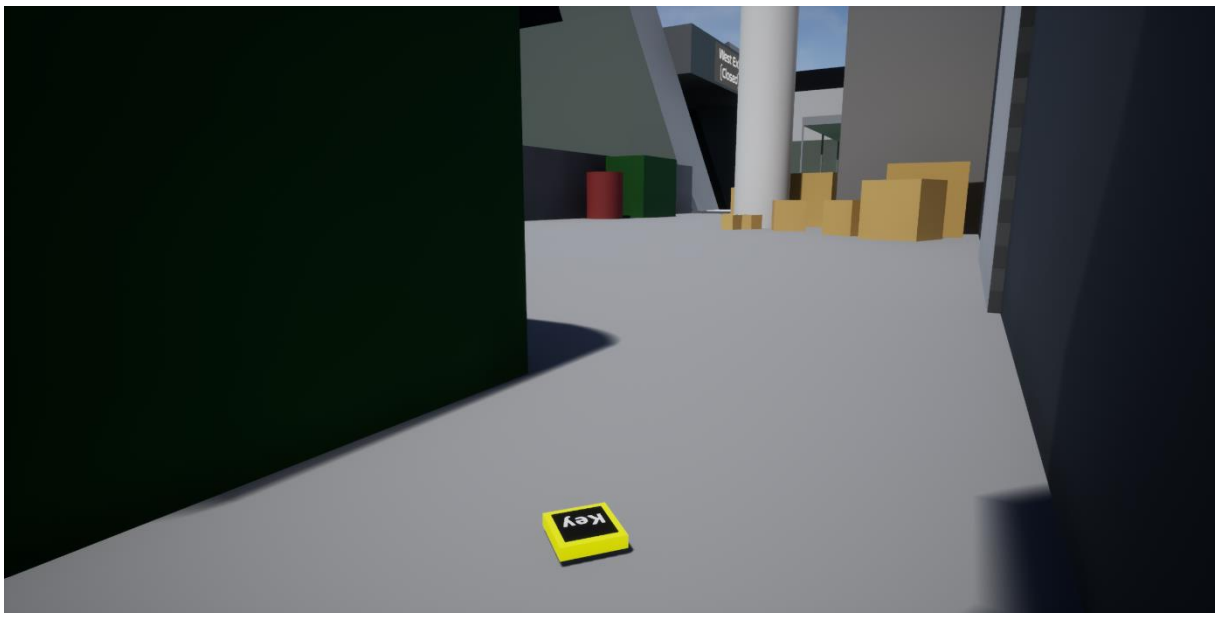
named Foxtrot, positioned in front of the second vacant building, has misplaced the previously mentioned yellow keycard necessary to access the building. Upon retrieving and returning the keycard, the player unlocks the building, revealing stacks of boxes inside, thereby resolving Foxtrot's dilemma and reinforcing the narrative of decay and disuse. Figure 5.029-5.035 shows these relevant locations.



(Figure 5.029: Assembly Workshop Alleyway)



(Figure 5.030: Assembly Workshop Alleyway)



(Figure 5.031: Assembly Workshop Alleyway and Yellow Keycard)



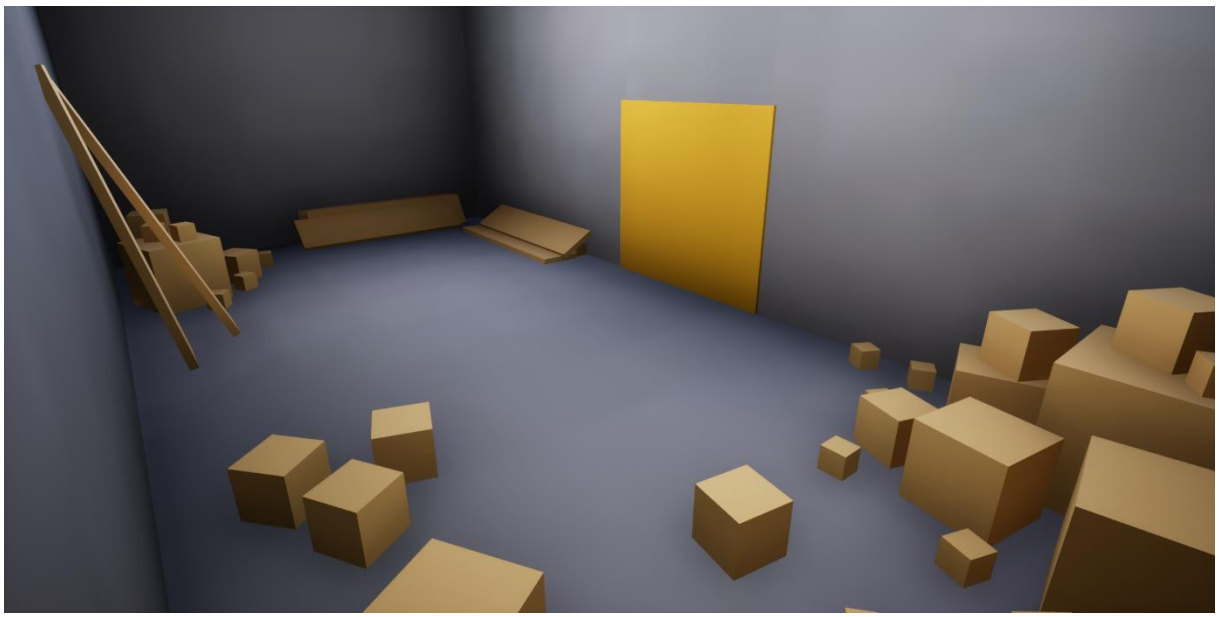
(Figure 5.032: Assembly Workshop and Vacant building)



(Figure 5.033: Foxtrot and Vacant Building)

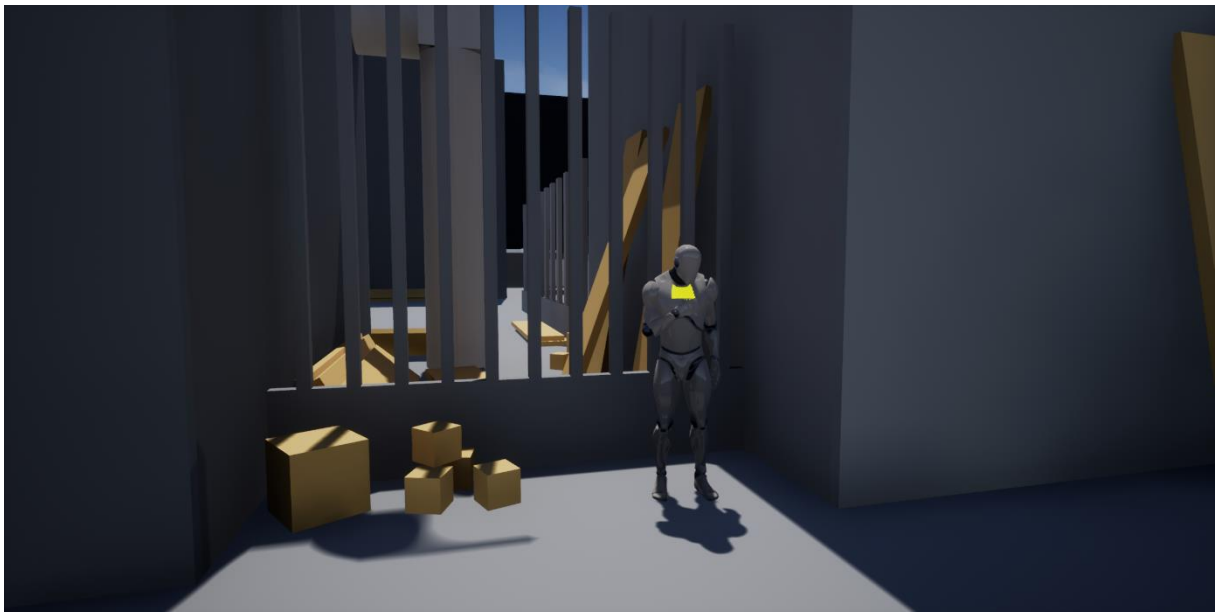


(Figure 5.034: Foxtrot and Yellow Keycard Reader)

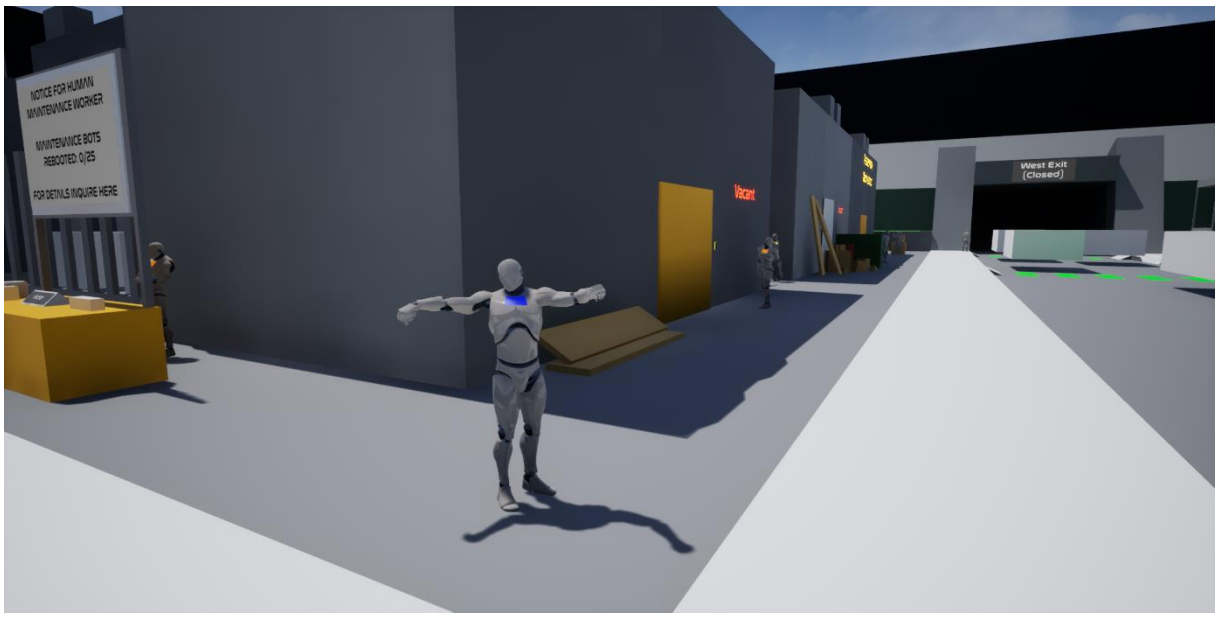


(Figure 5.035: Vacant Building – Interior)

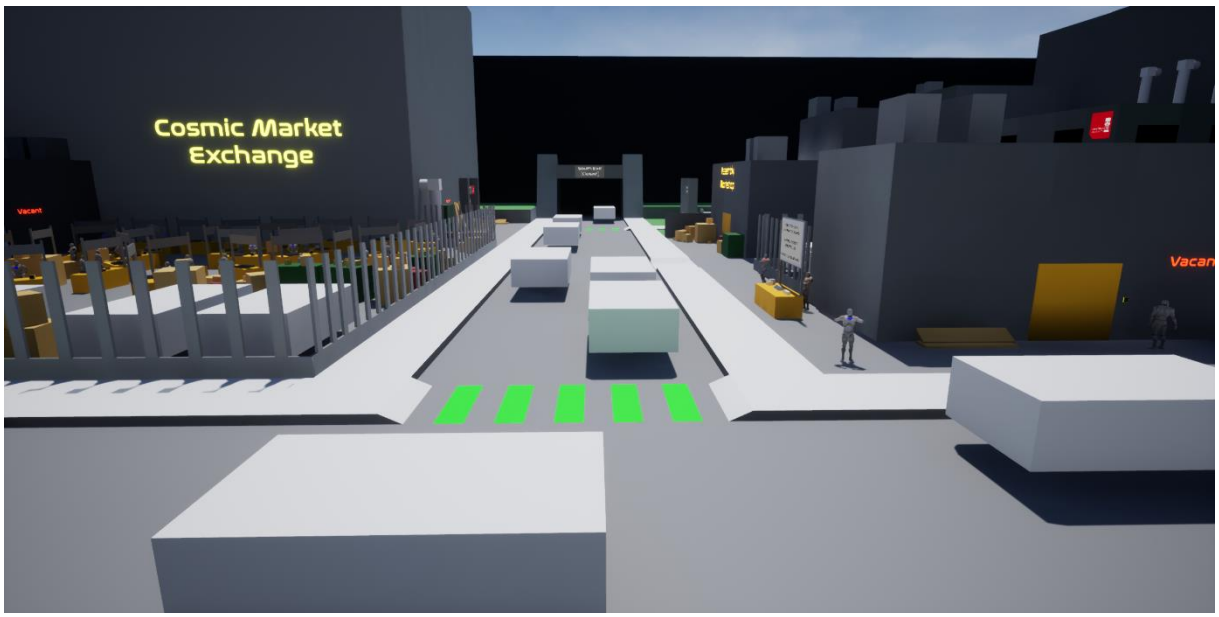
Between these buildings, another information bot hints at the general location of the keycard, assisting the player in their quest. Furthermore, at a road junction near the second vacant building, an information bot stands ready to explain the layout and main areas of the colony, orienting the player within the broader game world. This second road also has adjacent pathways and leads south to another closed tunnel outside the Staffs Uni Turing Campus. Figures 5.036-5.038 show these relevant locations.



(Figure 5.036: Information Bot between Vacant buildings)



(Figure 5.037: Information Bot at road junction)



(Figure 5.038: Road junction facing South)

On the pavement of the road heading south, a robot named Victor is positioned behind a stand. Victor monitors the maintenance status of the colony's robots, as indicated by a live noticeboard to the player that displays the number of bots that need rebooting and those already rebooted. Interaction with Victor involves him explaining the widespread need for robot maintenance and assigning the player a task of finding and rebooting maintenance bots throughout the colony. He also provides a refresher on how to use the Reboot Module, essential for progressing in this task. Figure 5.039 shows the status of the maintenance bot task.



(Figure 5.039: Victor and Maintenance Bot status)

Further down the road, another Assembly Workshop houses a robot named Gamma, who presents the player with a maze-guiding task similar to earlier challenges but with a differently shaped maze, adding variety to the gameplay. This workshop also contains another information bot, continuing the theme of informational support found throughout the colony. Figures 5.040-5.042 shows the exterior and interior of the second Assembly Workshop and adjoining maze.



(Figure 5.040: 2nd Assembly Workshop)



(Figure 5.041: Gamma and 2nd Assembly Workshop – Interior)



(Figure 5.042: 2nd Assembly Workshop maze)

Between the stand and the Assembly Workshop, there is an alley that expands into parking or delivery areas behind the buildings, and the area is populated with maintenance bots. Here, the player can encounter two robots engaged in a philosophical discussion about the purpose of their existence post-human departure. This interaction not only deepens the narrative but also encourages players to ponder broader existential themes that the robots face. Figures 5.043-5.045 show different shots of the alleyway.



(Figure 5.043: Alleyway beside 2nd Assembly Workshop – West-facing)

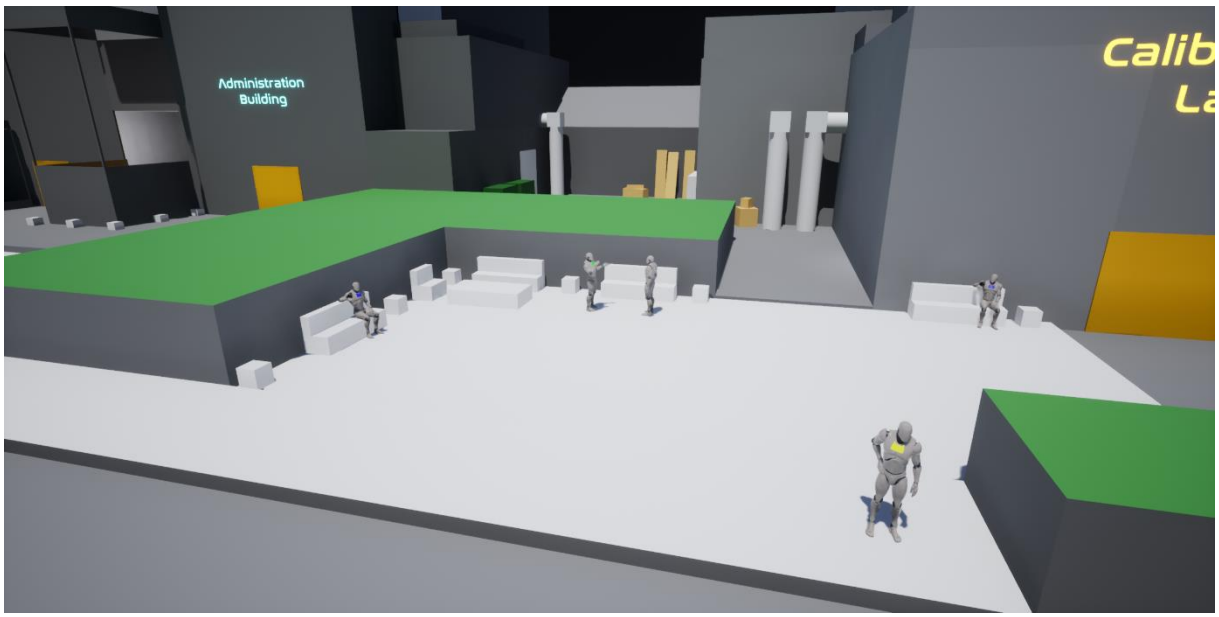


(Figure 5.044: Alleyway beside 2nd Assembly Workshop – Southwest-facing)



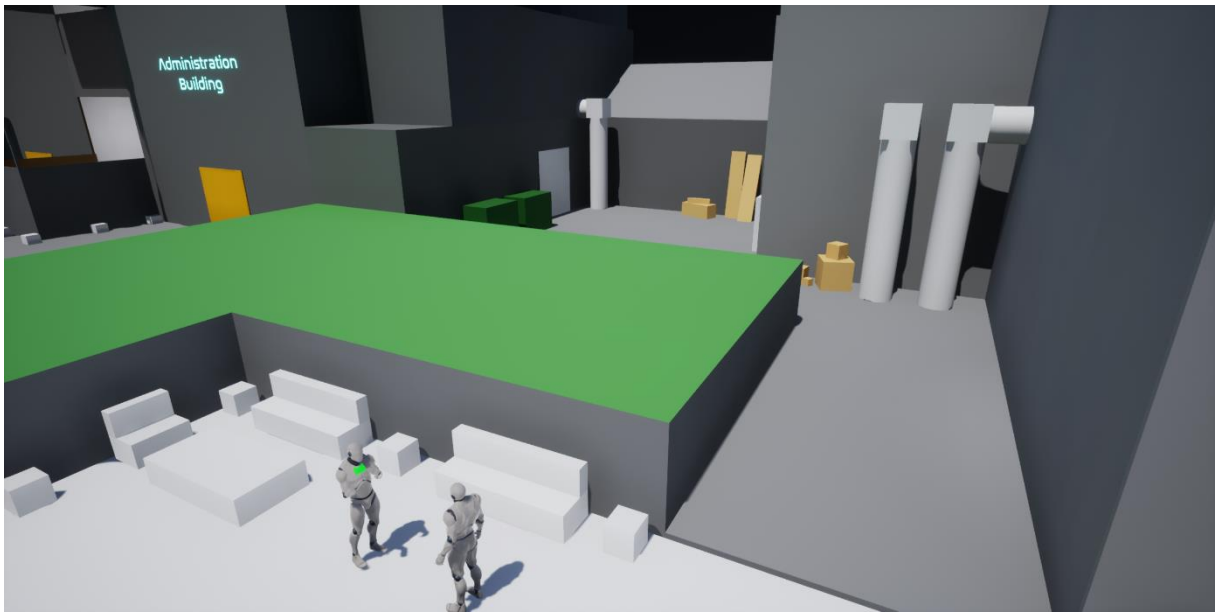
(Figure 5.045: Alleyway beside 2nd Assembly Workshop – Southeast-facing)

Across the road from the second vacant building and next to the Administration Building, a seating area filled with robots offers further opportunities for interaction. An informational robot recollects the past vibrancy of the colony, nostalgically reminiscing about the days when cars travelled the now-abandoned roads. Another information bot can be found expressing frustration at two nearby robots named Romeo and Juliette who appear to be panicked over losing something important. Romeo and Juliette are in distress over a lost Translation Disc, and if the player speaks with Juliette first, they will be answered in French. Romeo can explain their dilemma with the misplaced item, which, when found and returned by the player, restores Juliette's ability to speak English, illustrating the game's integration of language and technology as key narrative elements. Figure 5.046 shows the robots within the seating area.

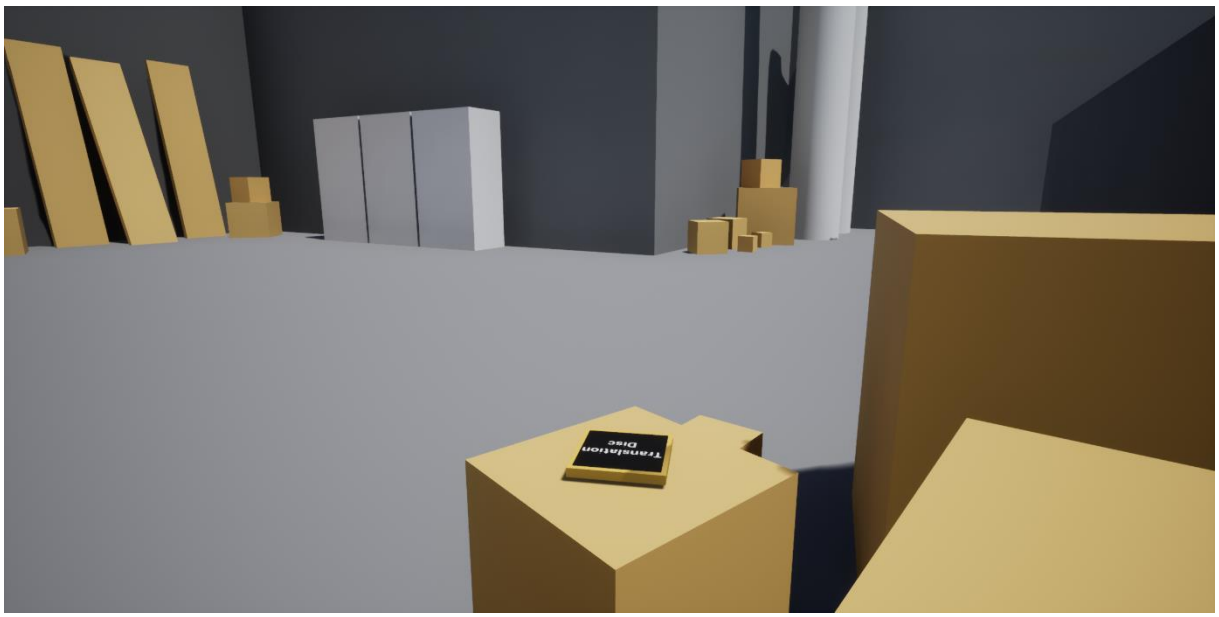


(Figure 5.046: Seating area beside Administration Building)

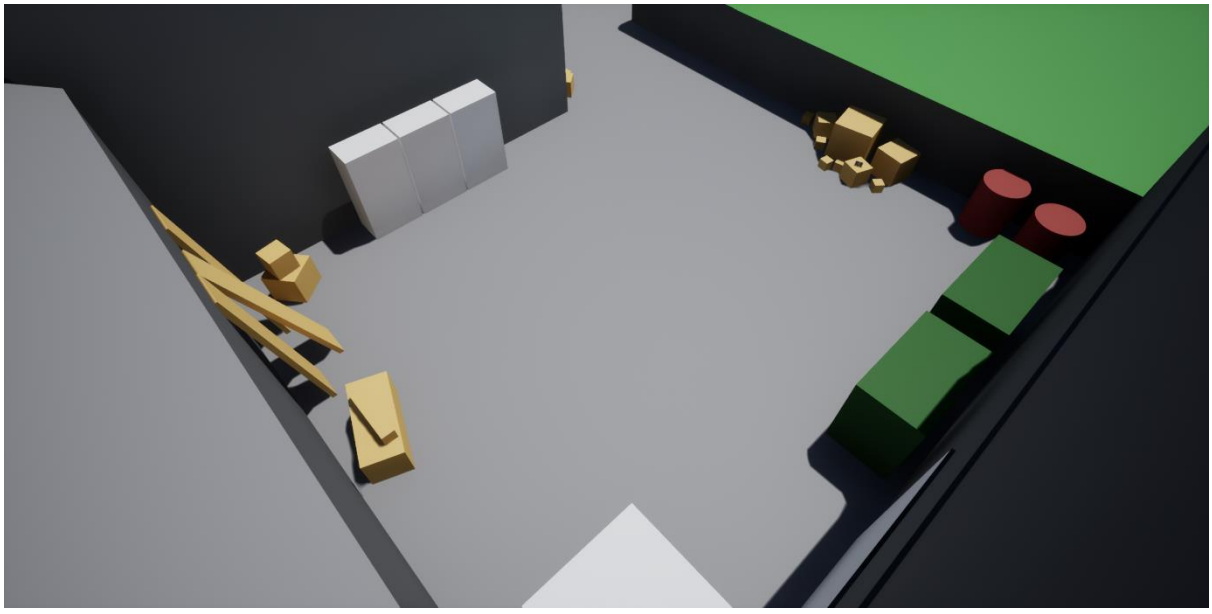
Adjacent to this scene is an alley leading next to the Administration Building where the Translation Disc is hidden, further tying together the locations and tasks within this district. Next to this alleyway, a Calibration Lab features two maintenance bots and introduces new characters, November and Theta, who engage the player in a cognitive colour challenge, continuing the interactive themes of the game. Figures 5.047-5.052 show the side alley, translation disc and Calibration Lab.



(Figure 5.047: Juliette, Romeo, and alleyway entrance)



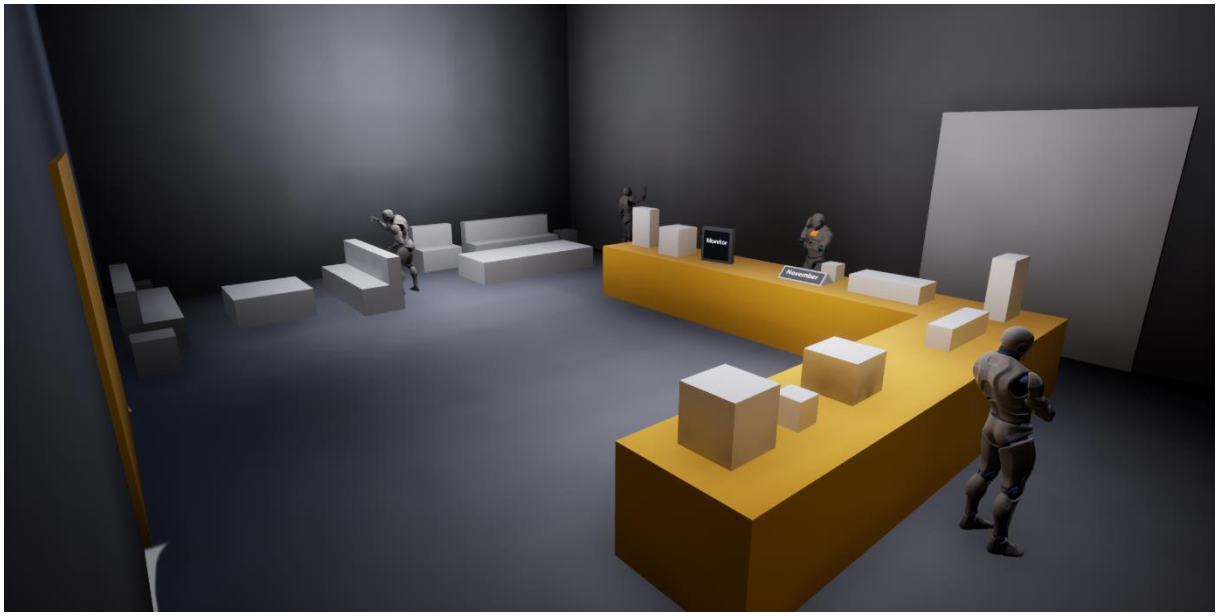
(Figure 5.048: Translation Disc in alleyway)



(Figure 5.049: Alleyway Isometric View)



(Figure 5.050: Calibration Lab)



(Figure 5.051: Calibration Lab – Interior)



(Figure 5.052: November, Theta, and calibration screen)

Outside this Calibration Lab, an information bot directs players inside, while another nearby bot guides them towards the Shopping District. Heading east, next to the Calibration Lab, another vacant building exists with a couple of informational bots nearby. One simply reiterates the direction of the Shopping District close by, whilst the other comments on the unfinished state of the colony, lamenting the abandonment before the colony's full potential could be realised. Figures 5.053-5.054 show where various robots are along this strip.



(Figure 5.053: Robots outside Calibration Lab and Vacant Building, East-facing)



(Figure 5.054: Robots outside Calibration Lab and Vacant Building, West-facing)

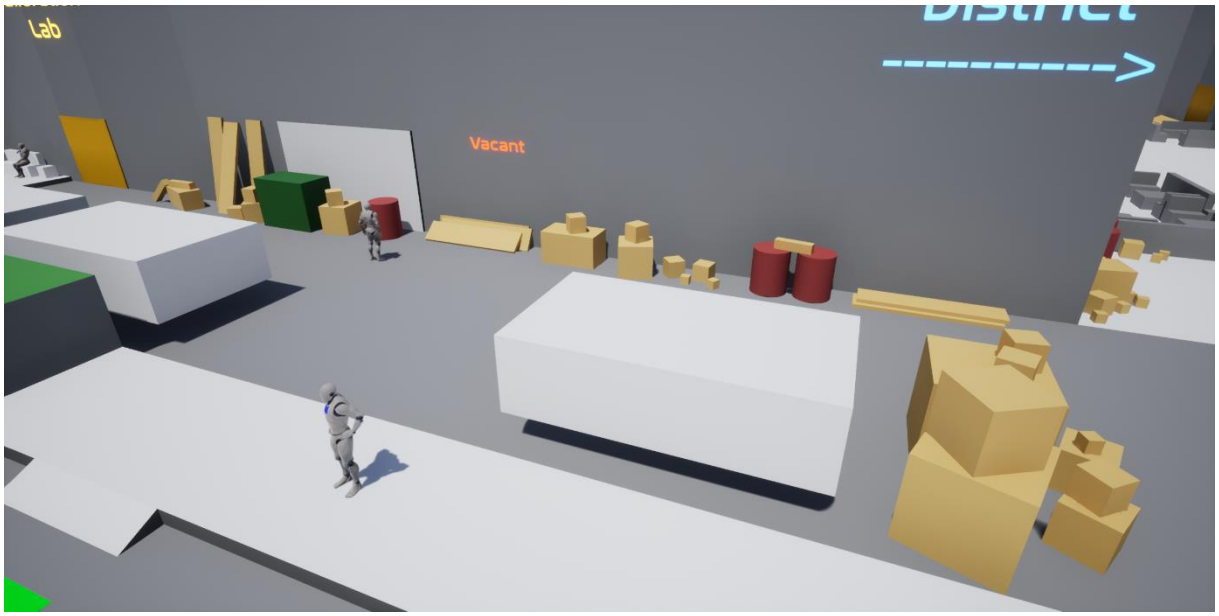
This end section of the road leads directly to the Shopping District and Cosmic Market Exchange on each side, setting the stage for the next phase of exploration. Figure 5.055 shows the east end of the main road, where the two other main areas can be entered.



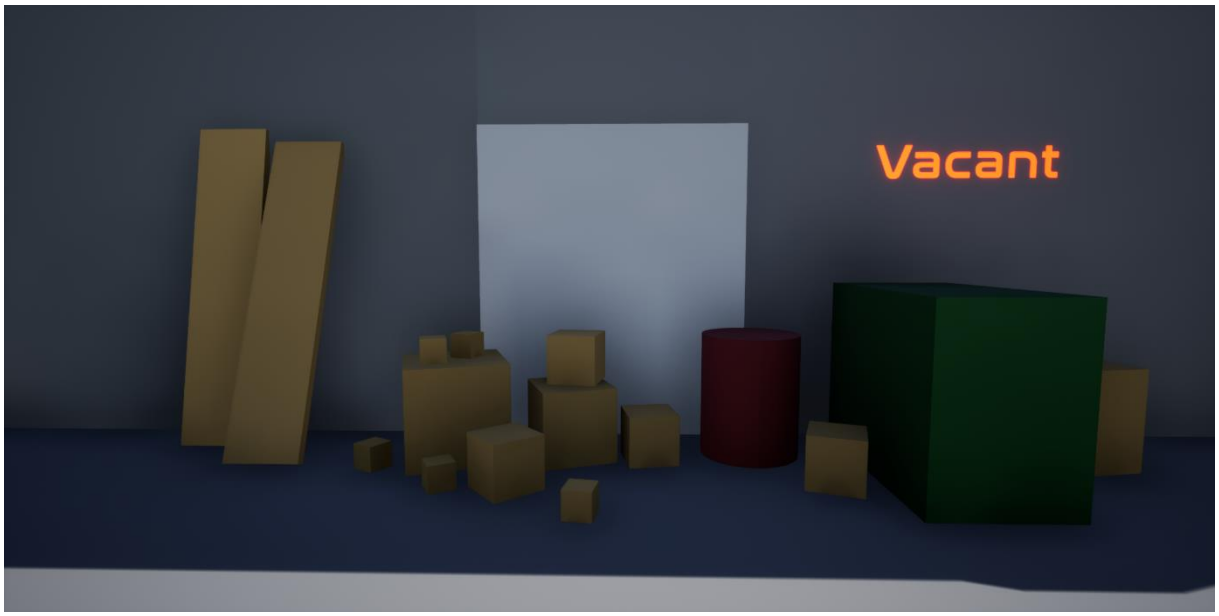
(Figure 5.055: Entrances to Shopping District and Cosmic Market Exchange)

Additionally, throughout the Administration District, pathways in front of buildings are littered with boxes and building supplies, creating an atmosphere of abandonment and unfinished projects, which visually and thematically support the narrative of a once-bustling colony now eerily quiet

and in decline. Figures 5.056-5.057 show examples of asset dressing used throughout the map.



(Figure 5.056: Asset dressing example)



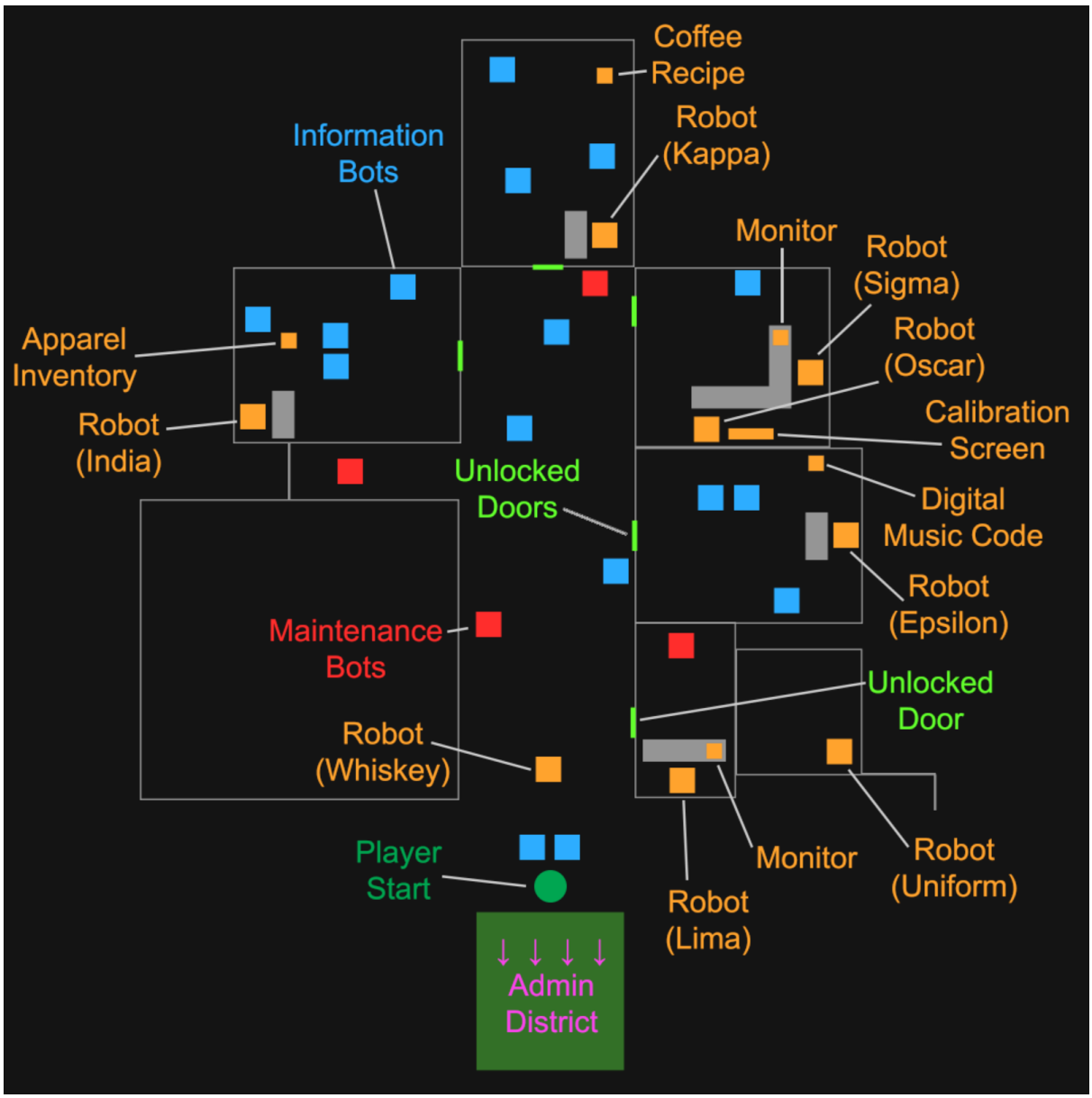
(Figure 5.057: Asset dressing example)

Overall, the Administration District serves as a foundational area in the experimental game, blending deeper narrative-driven tasks and the broader narrative context of a post-human robotic colony. This district is designed to foster an environment for player exploration and interaction, setting the thematic tone of decay and technological neglect through environmental storytelling and NPC interactions.

Following on from the tutorial section, this district effectively uses environmental cues and NPC interactions to strengthen player skills with the game's core interaction systems. As players progress deeper into the district, the scope of exploration and interaction expands. The presence of various robots, such as Victor and the emotionally charged duo, Romeo and Juliette, deepens the player's experience. Miscellaneous NPCs offer tasks that integrate mechanical gameplay elements and also provoke thoughtful engagement with themes of purpose, memory, and continuity in a world abandoned by humans. Informational bots strategically placed throughout the district guide players seamlessly from one area to the next, maintaining narrative coherence and continuity in gameplay.

- Shopping District

  One of the side areas off the Administration District is the Shopping District, which builds on the open-world exploration goals of the experimental game. This area is crafted to provide further immersive, narrative-rich experiences that engage players in more varieties of task-solving and NPC interaction by building upon the skills they have used so far to traverse this world. Figures 5.058-5.059 show the level design layout of the district, and screenshot of the entrance.

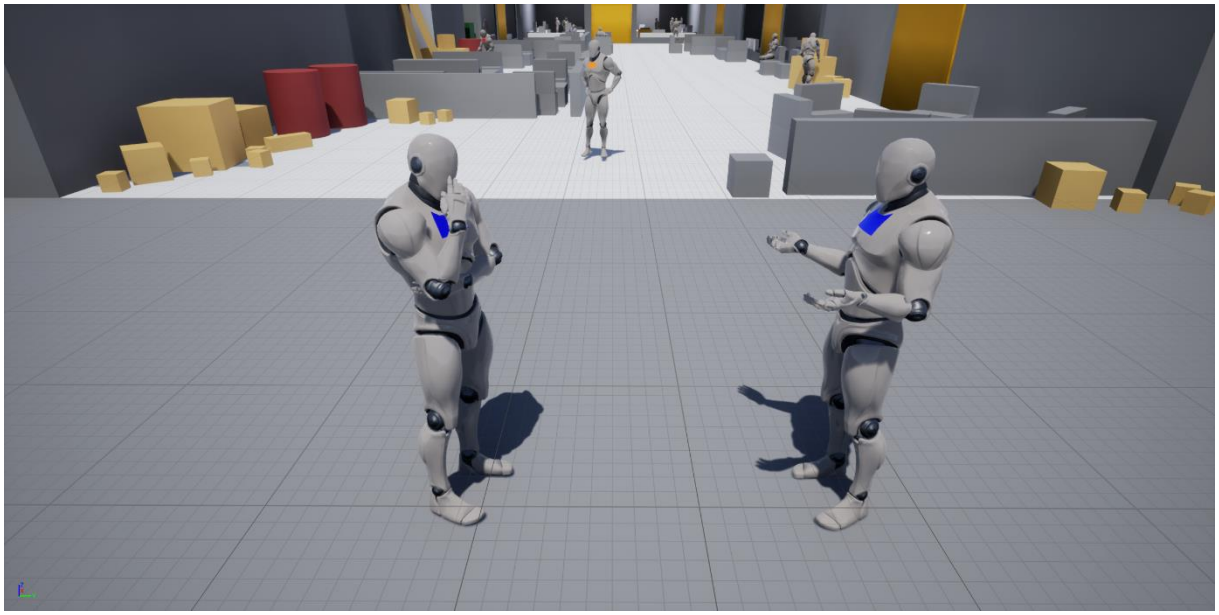


(Figure 5.058: Level layout for the Shopping District)



(Figure 5.059: Shopping District)

As players enter this vibrant district, they encounter two robots near the entrance who are engaged in a reflective conversation that builds on the emotional tone of the game. One robot expresses excitement about visiting the shops, reminiscent of human activity, while the other acknowledges this excitement but also notes the melancholy of seeing the district far from its bustling past. Figure 5.060 shows these two robots at the district entrance.



(Figure 5.060: Two robots in discussion)

At the district's entrance, a robot named Whiskey assigns the player the task to rectify incorrect deliveries that are affecting the three main shops in the

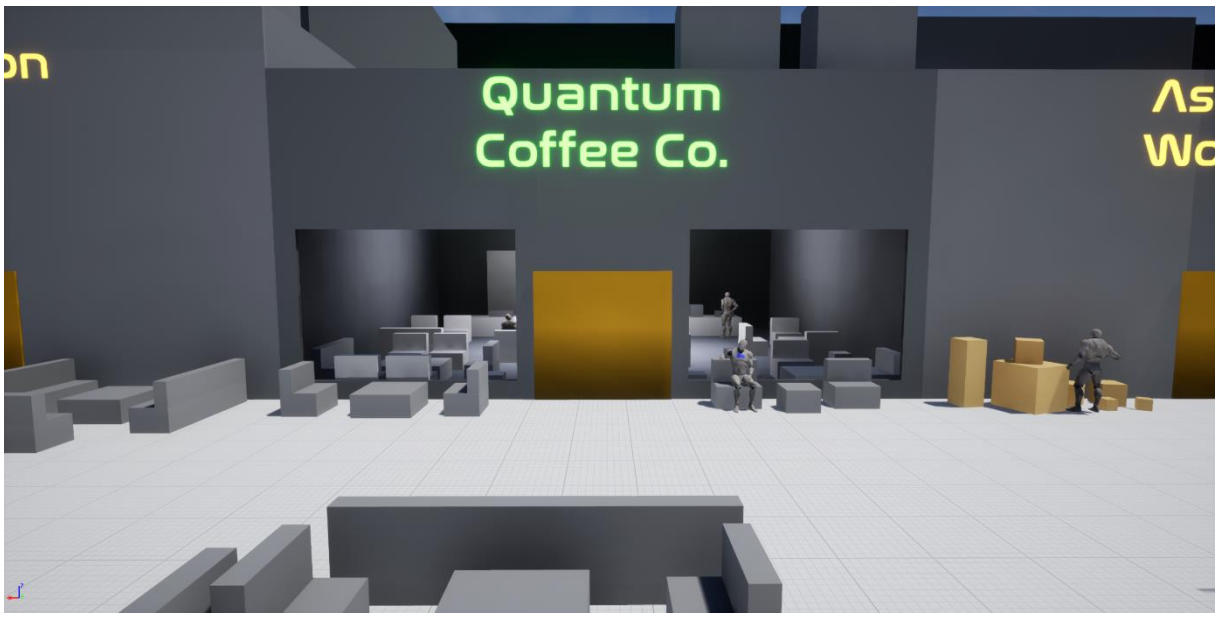
area. Whiskey's introduction not only serves as a guide but also builds the player's understanding of the daily operations within the district. Whiskey directs the player to engage with the robots running the stores to ascertain the specifics of their inventory issues. Figure 5.061 shows Whiskey at the district entrance.



(Figure 5.061: Whiskey)

The first shop is Quantum Coffee Co. which is managed by a robot called Epsilon who faces an inventory error where they received a Digital Music Code instead of their required Coffee Recipe. Similarly, the Virtual Vinyl Vault, overseen by India, has mistakenly received an Apparel Inventory instead of the needed Digital Music Code. Lastly, the Futuristic Fashion Hub, run by Kappa, received a Coffee Recipe in place of an Apparel Inventory. Each incorrectly received item is placed within the respective stores, prompting players to explore the interiors and interact with the environment.

The player’s task involves retrieving these misplaced items and returning them to the correct shops; a process that involves simple logical deduction. This exploration also enhances player interaction with the NPC shopkeepers, fostering a greater connection to the district's commercial ecosystem and inhabitants. Figures 5.062-5.073 show screenshots of the interior and exterior of the main stores, along with items relevant to the task.



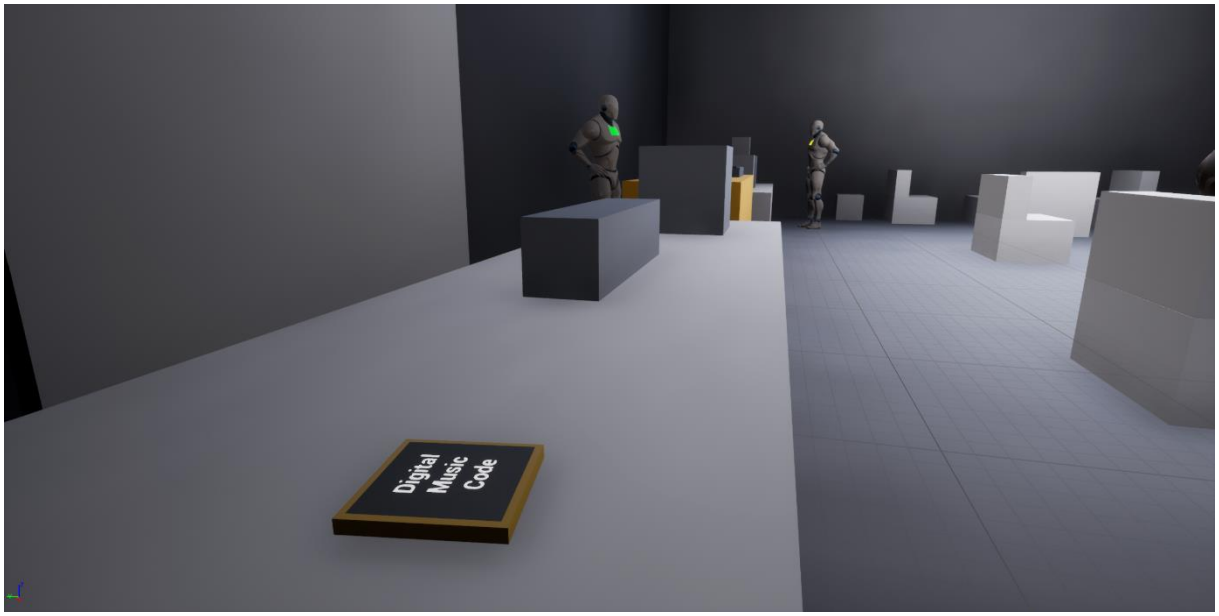
(Figure 5.062: Quantum Coffee Co. – Exterior)



(Figure 5.063: Quantum Coffee Co. – Interior)



(Figure 5.064: Quantum Coffee Co. – Epsilon)



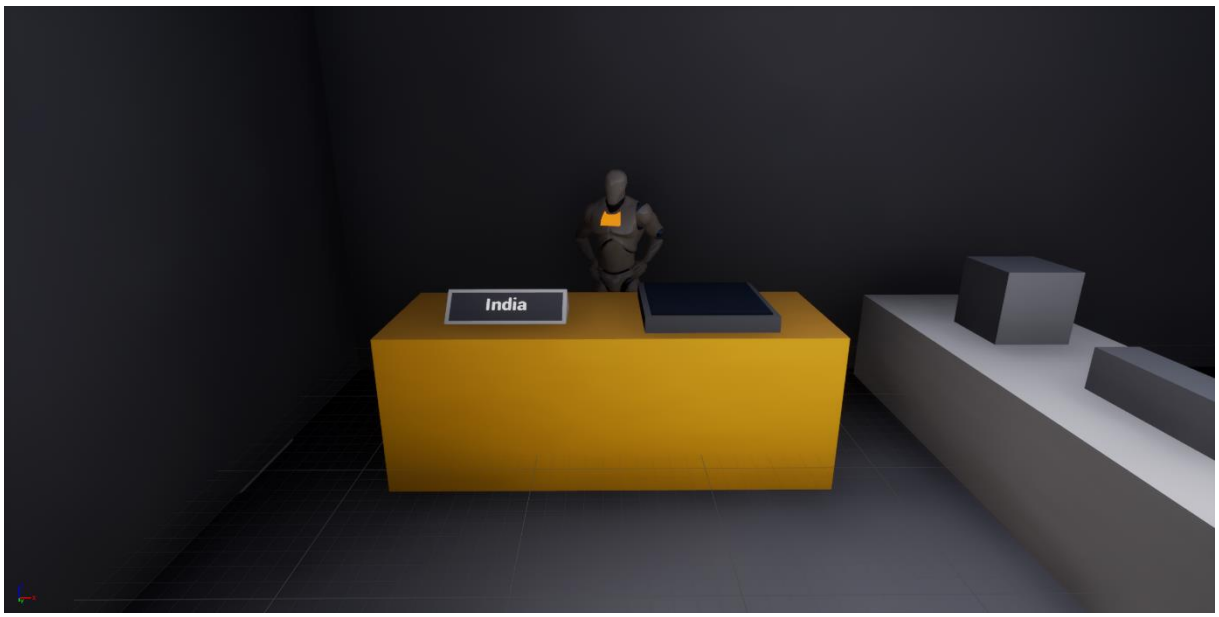
(Figure 5.065: Quantum Coffee Co. – Digital Music Code)



(Figure 5.066: Virtual Vinyl Vault – Exterior)



(Figure 5.067: Virtual Vinyl Vault – Interior)



(Figure 5.068: Virtual Vinyl Vault – India)



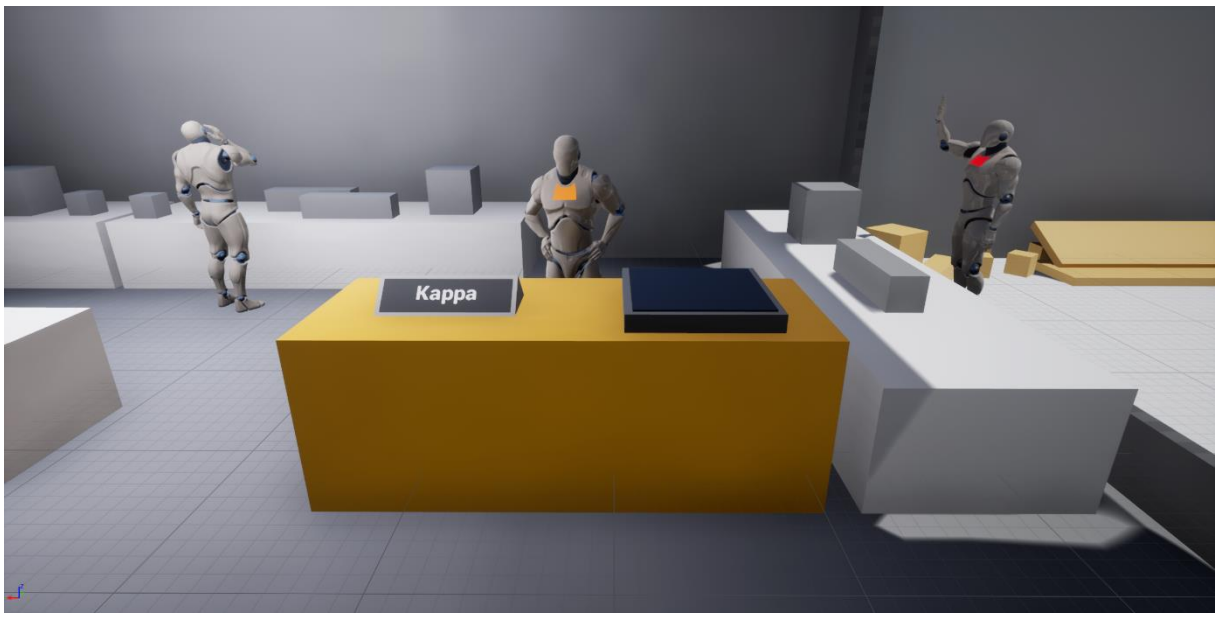
(Figure 5.069: Virtual Vinyl Vault – Apparel Inventory)



(Figure 5.070: Futuristic Fashion Hub – Exterior)



(Figure 5.071: Futuristic Fashion Hub – Interior)



(Figure 5.072: Futuristic Fashion Hub – Kappa)

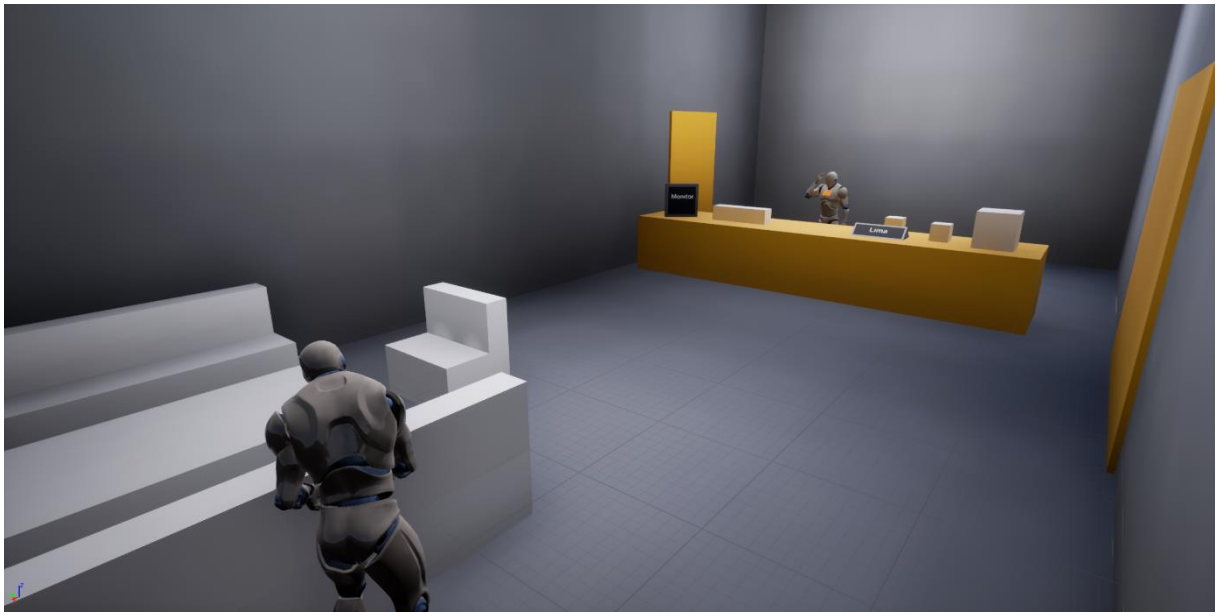


(Figure 5.073: Futuristic Fashion Hub – Coffee Recipe)

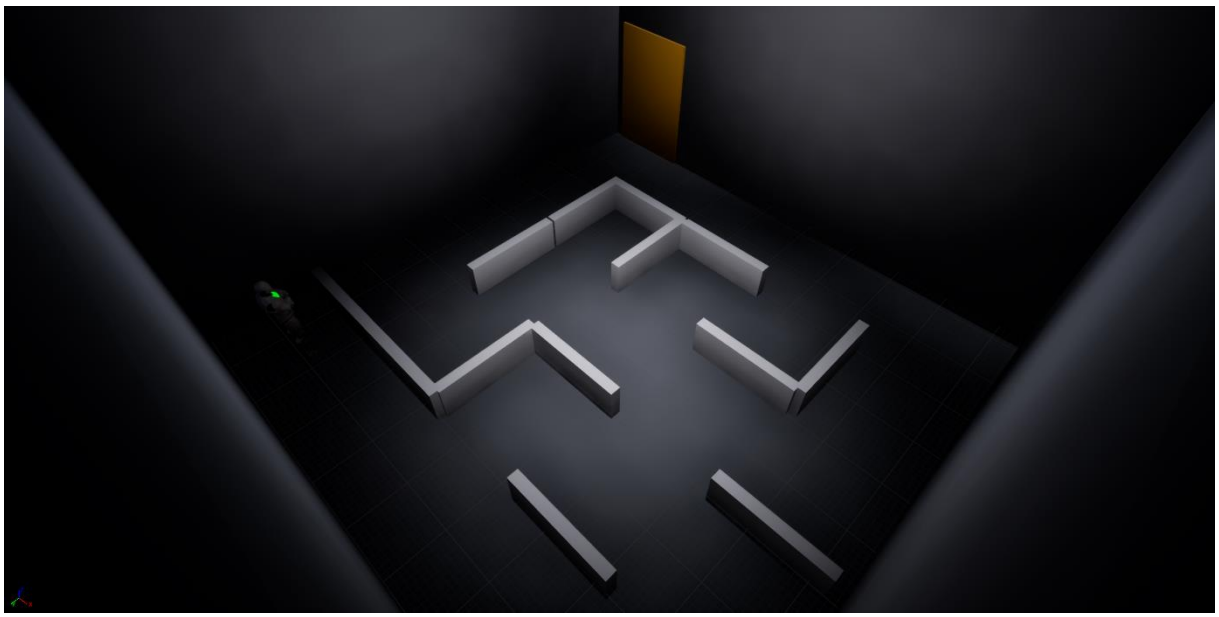
Beyond the central task, the district is supplemented with additional interactive opportunities. Another Assembly Workshop located here contains a robot named Gamma who presents a new maze-guiding challenge, maintaining thematic consistency with previous puzzles while introducing a uniquely shaped maze to challenge the player further. This workshop also hosts an information bot, providing additional guidance and narrative context. Figures 5.074-5.076 show the third Assembly Workshop and adjoining maze.



(Figure 5.074: 3rd Assembly Workshop – Exterior)



(Figure 5.075: Lima and 3rd Assembly Workshop – Interior)



(Figure 5.076: 3rd Assembly Workshop Maze)

Additionally, another Calibration Lab in the district introduces two new characters, Sigma and Oscar, who engage the player in an additional cognitive colour challenge, continuing the educational and interactive themes prevalent in the game. Figures 5.077-5.078 show the interior and exterior of the second Calibration Lab.



(Figure 5.077: 2nd Calibration Lab – Exterior)



(Figure 5.078: 2nd Calibration Lab – Interior)

Maintenance bots and information bots are also placed throughout the district, both inside and outside the shops, enhancing the realism of the environment and providing continuous interaction opportunities. These elements collectively create a dynamic and engaging district that not only challenges the player with specific tasks but also invites them into the nuanced narrative of a once-thriving commercial hub now echoing its vibrant past. Through these interactions and tasks, the Shopping District serves as a critical reiteration of the game's core themes that enhances the depth of the world whilst aligning with the overarching ideas of communication and technology. Figure 5.079 shows an example of robot placement.

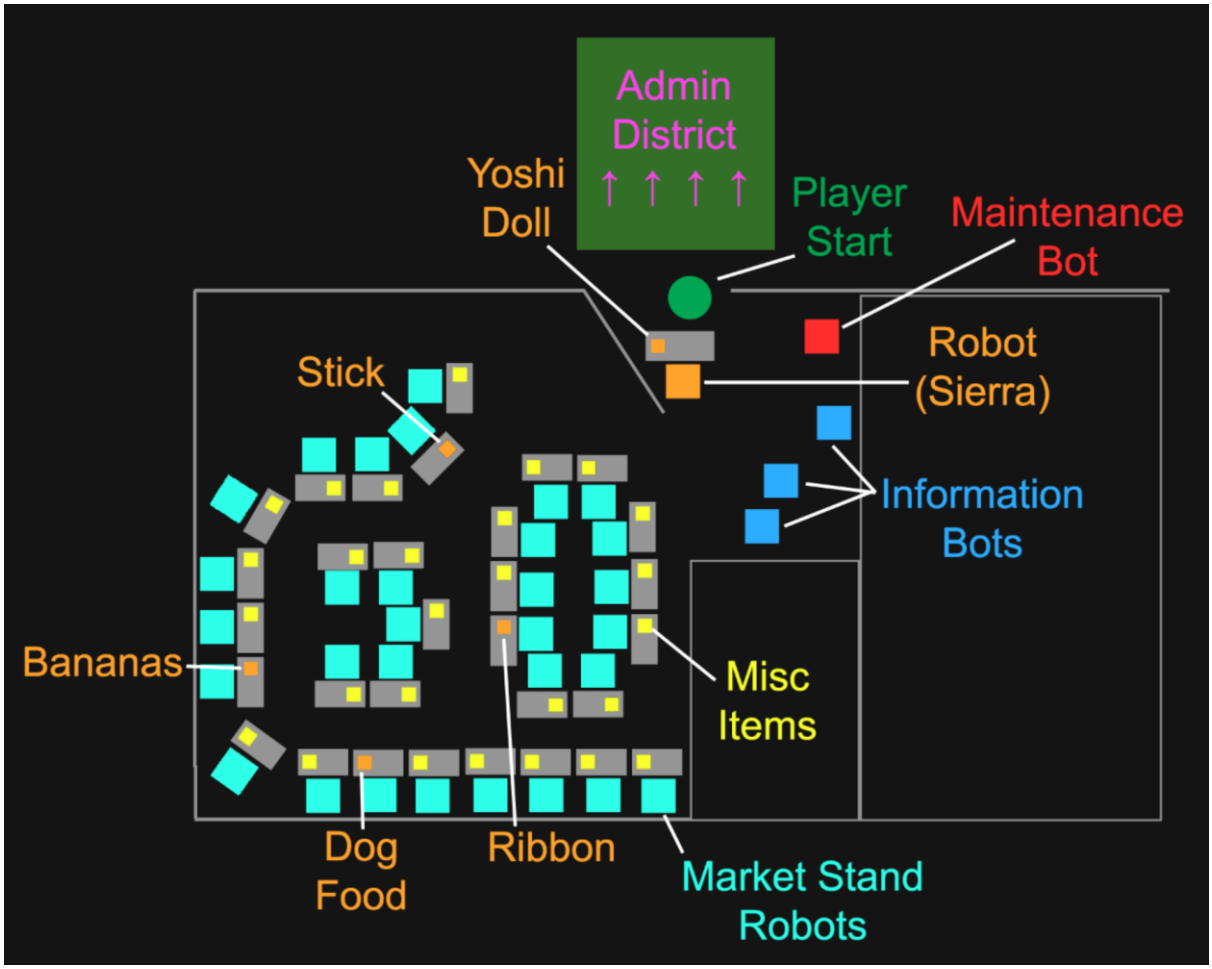


(Figure 5.079: Example of Information Bots and Maintenance Bots)

- Cosmic Market Exchange

  The Cosmic Market Exchange represents another component of the game's expansive world, positioned across the road from the Shopping District. This area is crafted to replicate the atmosphere of an open-air market, with various stands each manned by robots. This design choice enhances the game's thematic depth within a dynamically interactive setting.

  As illustrated in Figure 5.080, the layout of the Cosmic Market Exchange is designed to facilitate easy navigation while encouraging exploration. Each market stand, distinctively featuring a unique item, is manned by a robot, creating a series of potential interactions for the player. Figure 5.081 shows an aerial shot of the area in its entirety.



(Figure 5.080: Level layout for the Cosmic Market Exchange)

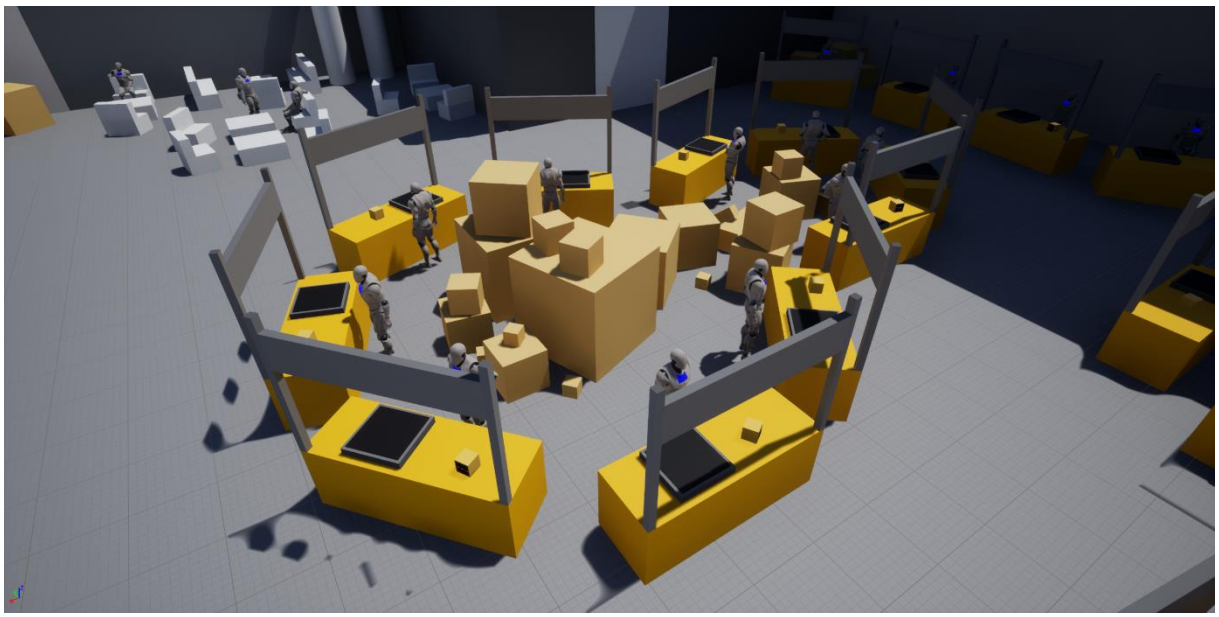


(Figure 5.081: Cosmic Market Exchange)

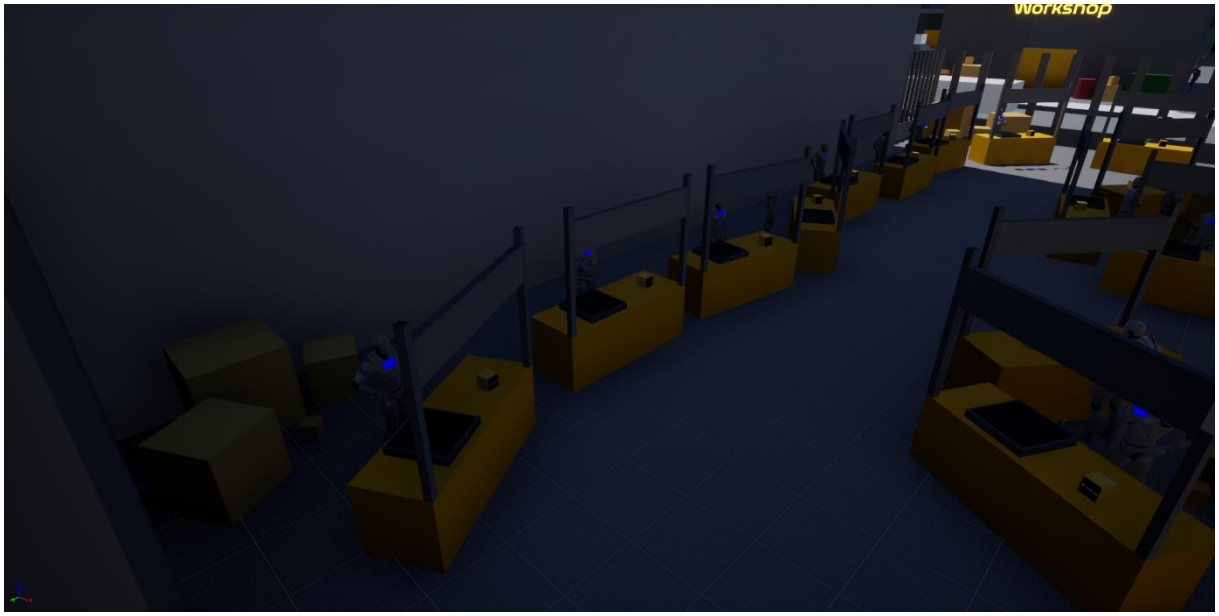
The trading task commences with a robot named Sierra, who serves as the welcoming Figure and initial point of contact at the market's entrance. Sierra's role introduces the player to the market's trading dynamics, guiding them into the sequence of exchange interactions that define the market experience. Figures 5.082-5.086 show Sierra and the layout of the market stands in the area.



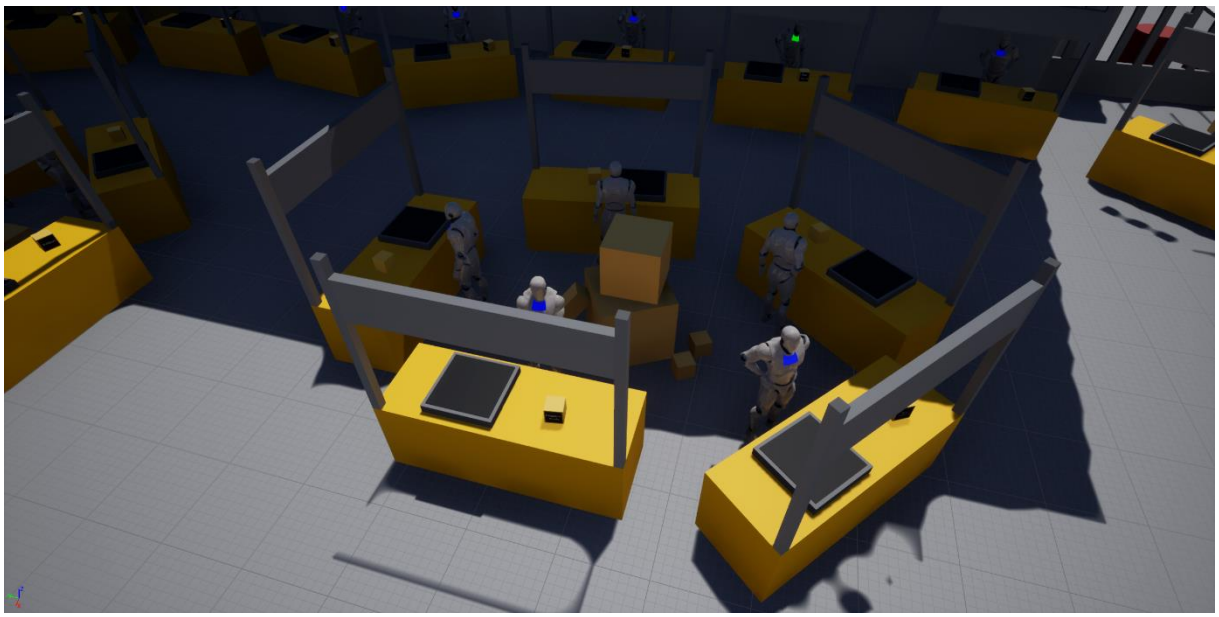
(Figure 5.082: Sierra)



(Figure 5.083: Market Stands)



(Figure 5.084: Market Stands)



(Figure 5.085: Market Stands)



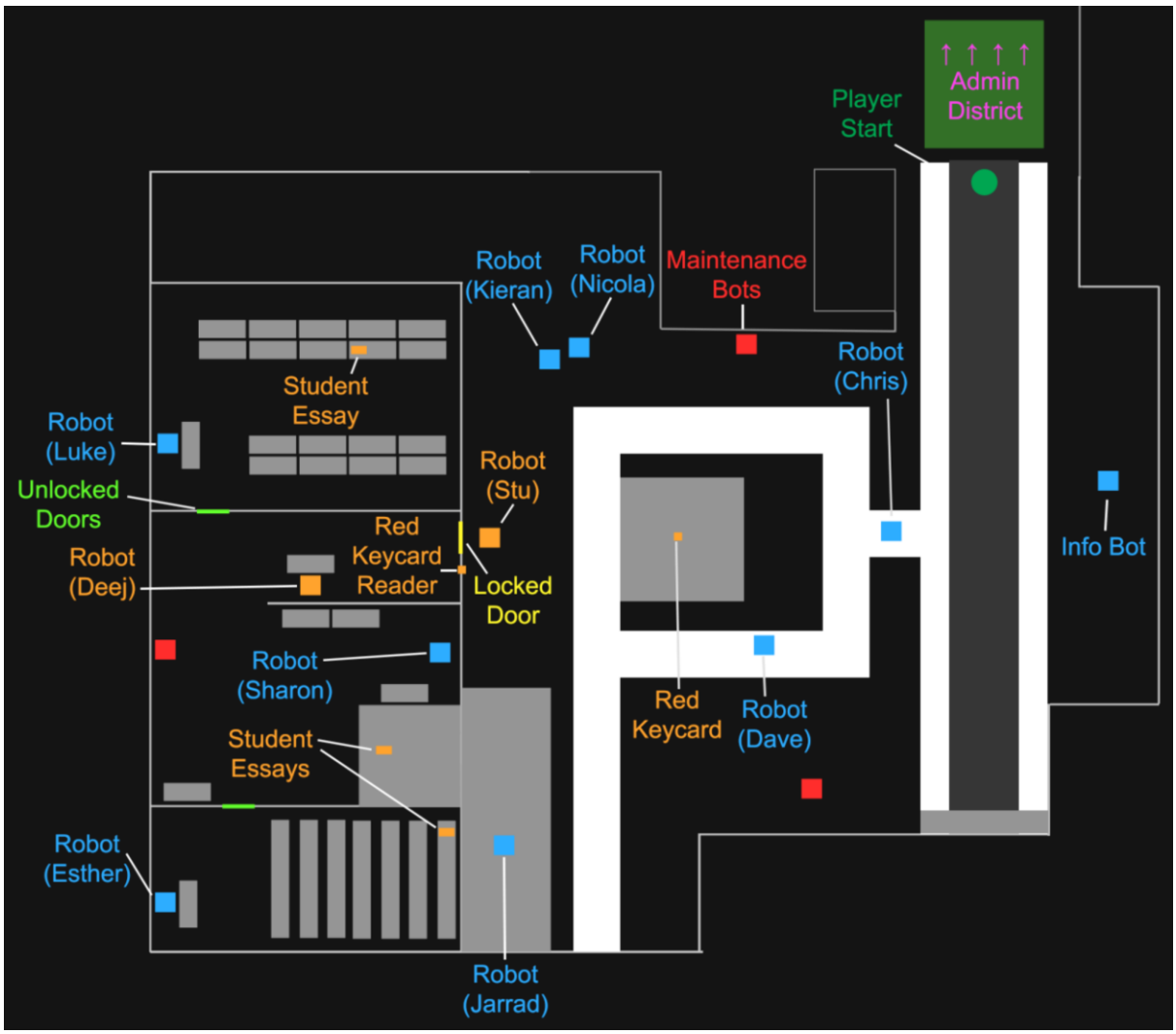
(Figure 5.086: Market Stands)

Additionally, near the entrance, a small gathering area is populated with several information bots and a maintenance bot. This area serves as a social hub within the market, providing players with opportunities to gather information, receive guidance, and interact with the bots in a less structured environment compared to the transactional nature of the market stands. Figure 5.087 shows the additional information bots and maintenance bot placement.

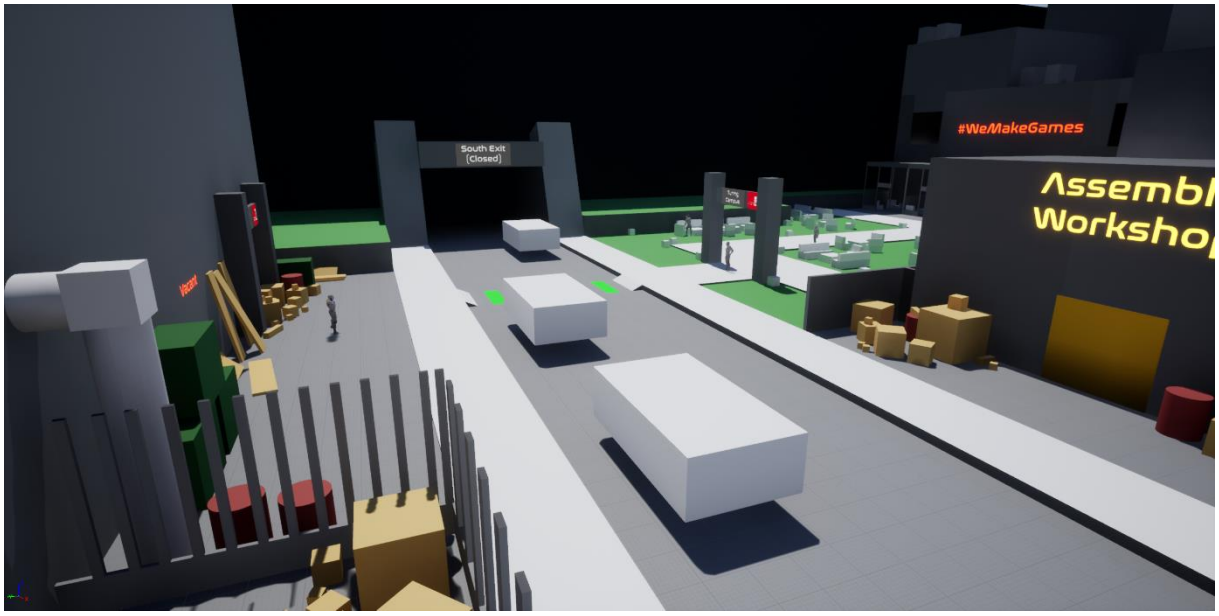


(Figure 5.087: Group of information and maintenance bots)

- Staffordshire University: Turing Campus.
  The Staffordshire University Turing Campus is designed to reflect both a historical centre of academic life and the current desolation following human departure. Located at the southern terminus of the main road, adjacent to a closed tunnel, the campus is split into two main areas, enhancing the narrative discovery. Figure 5.088 shows the level design layout of the campus, whilst Figures 5.089-5.090 show shots of the area in its entirety.



(Figure 5.088: Level layout for the Staffordshire University Campus)

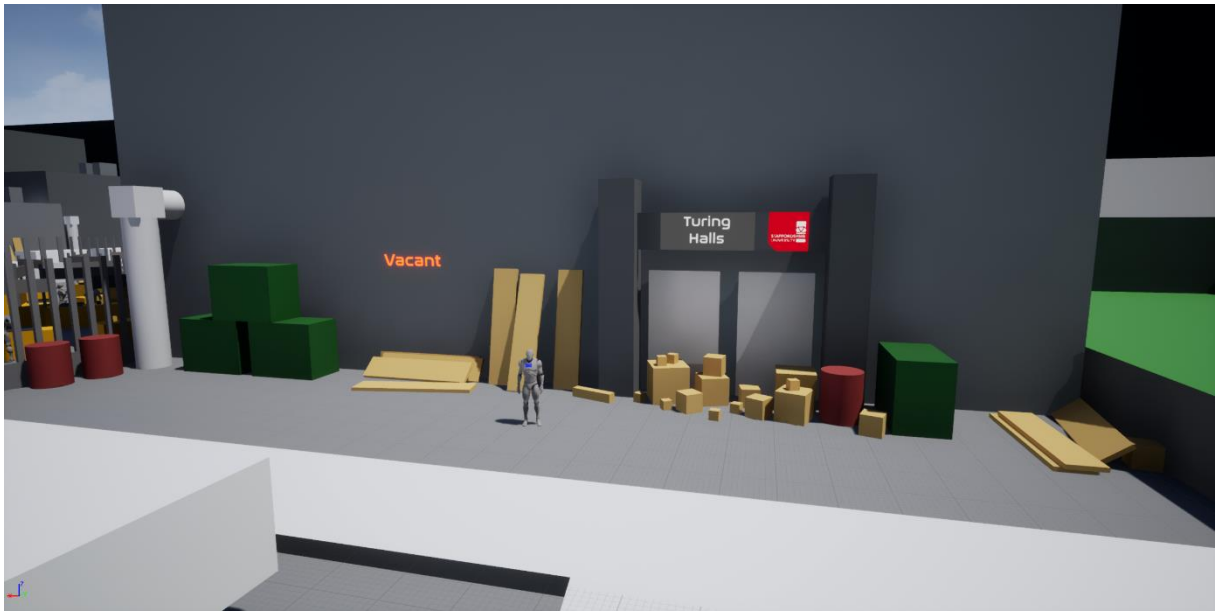


(Figure 5.089: Staffs Uni Campus, south facing)



(Figure 5.090: Staffs Uni campus, west-facing)

On the southeastern side of the road sits a large building, designated as dormitories, now closed and silent. An information bot stationed outside provides context, reminiscing about the times when these dorms buzzed with activity from students engaged in game development studies. This narrative element effectively contrasts the past vibrancy with the present quiet, mirroring the overarching theme of abandonment that permeates the colony.



(Figure 5.091: Staffs Uni dormitory)

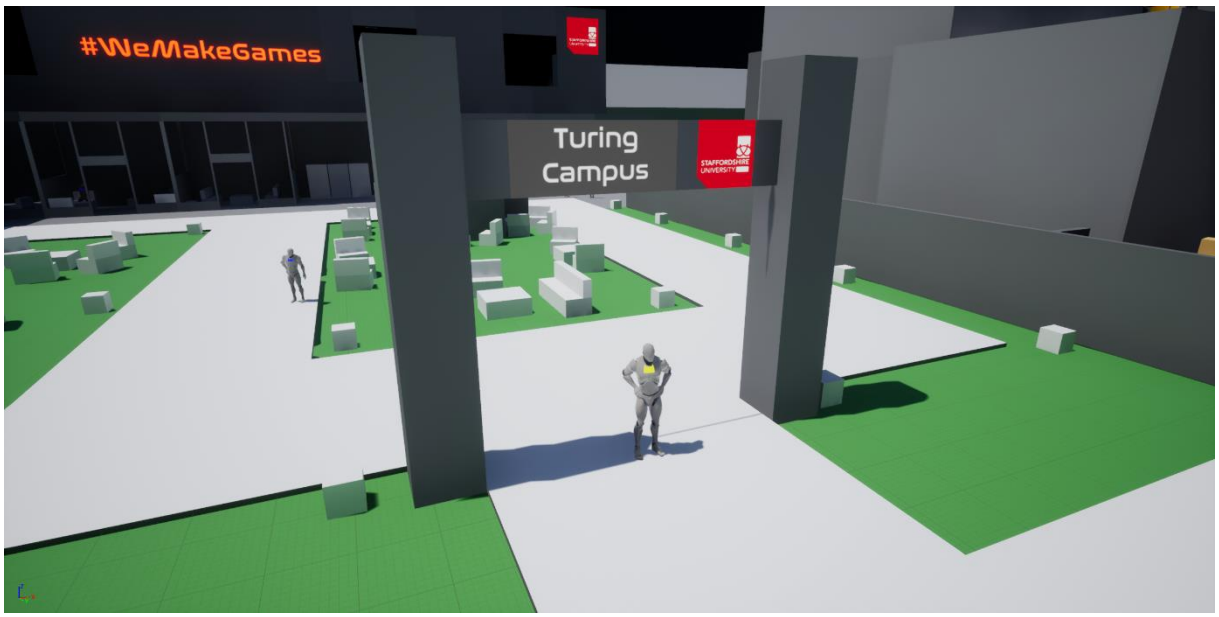
Opposite the dorms, the main campus area unfolds as an open space filled with seating areas, walking paths, and a central stage, designed to evoke the

feel of a once-active university life. Maintenance bots can also be found in the area, adding a layer of interaction and a subtle reminder of the ongoing decay and the need for upkeep. The main campus building, a significant structure in the game, stands across the open area. Figure 5.092 shows the main campus building and courtyard.



(Figure 5.092: Staffs Uni campus)

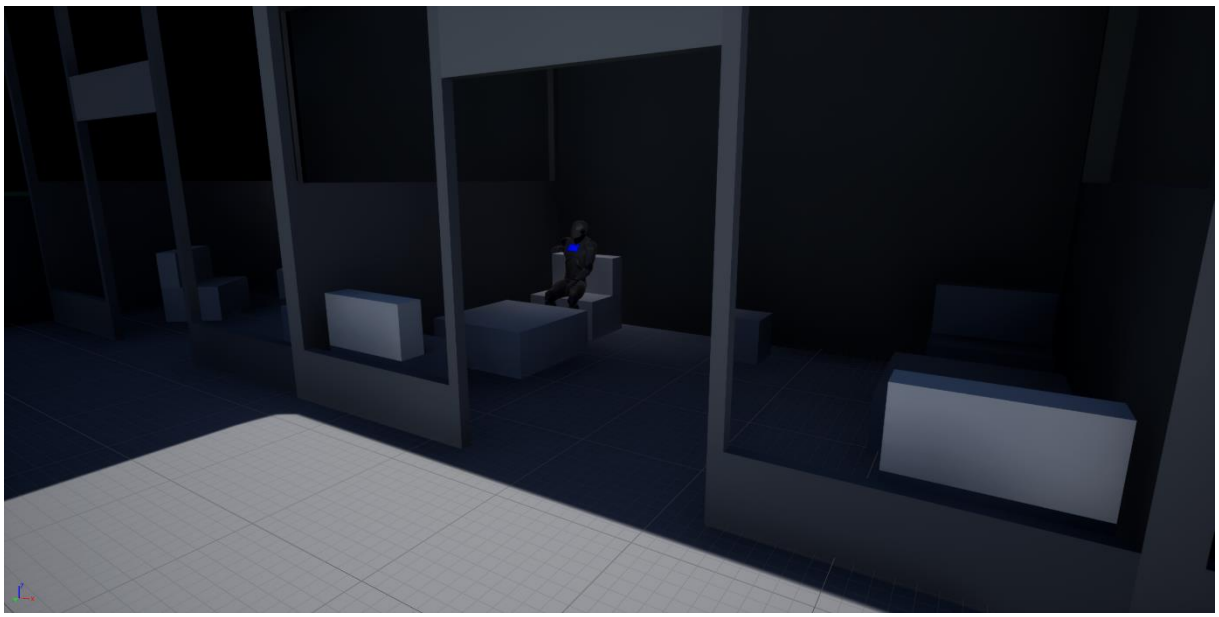
As players enter the campus through an archway, they meet an information bot named Chris. Chris introduces the concept that many robots on this campus have their personalities modelled after lecturers from the original games department at Staffordshire University. This intriguing setup not only serves as a homage to the educational institution but also enriches the player's interaction with these characters. Notable robots such as Dave, Jarrad, Kieran, and Nicola are dotted throughout the open area, each offering insights into the academic specialties of the lecturers they represent, thereby providing a layer of educational content within the game. Figures 5.093-5.096 show the robots Chris, Dave, Jarrad, Nicola, and Kieran.



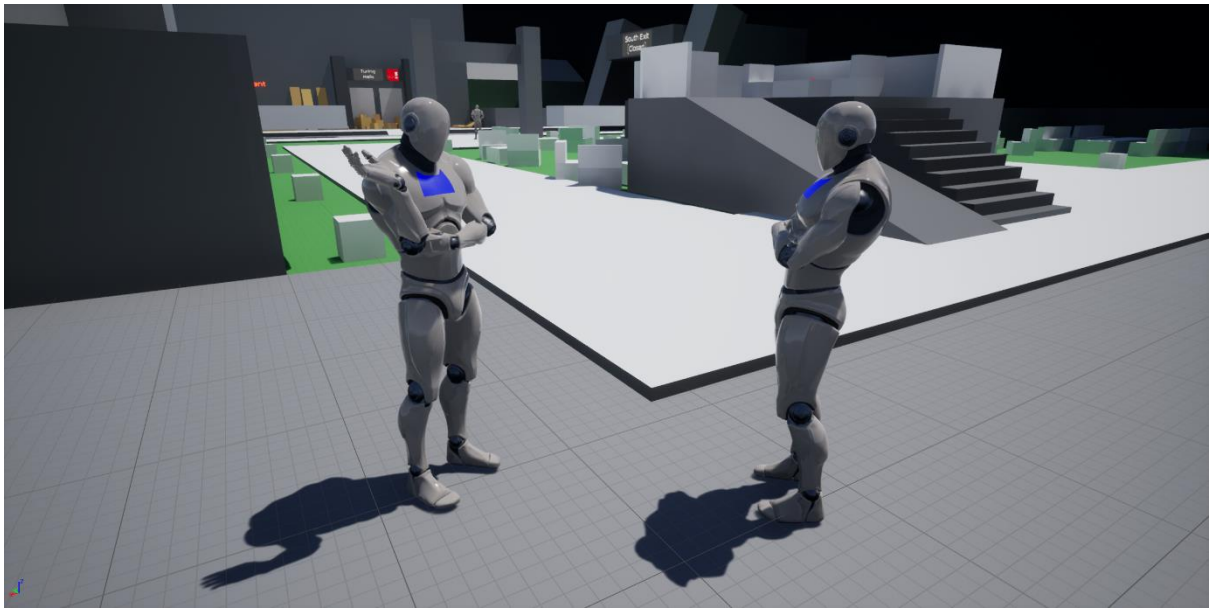
(Figure 5.093: Chris at entrance archway)



(Figure 5.094: Dave on one of the courtyard pathways)



(Figure 5.095: Jarrad outside the main building)

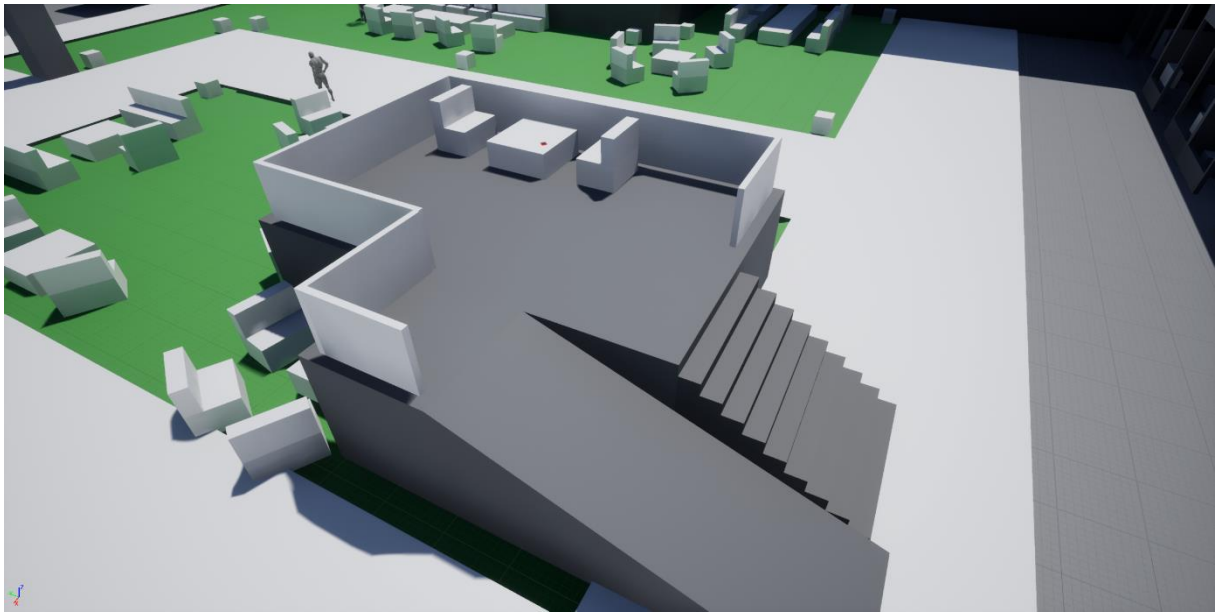


(Figure 5.096: Nicola and Kieran outside the main building)

At the campus building's entrance, a robot named Stu presents the first obstacle of the area, having lost the red keycard needed to access the building. The keycard itself is located on the centre stage in the courtyard. Figures 5.097-5.099 show Stu, the red keycard reader and the red keycard.



(Figure 5.097: Stu and Red Keycard Reader)



(Figure 5.098: Courtyard centre platform)



(Figure 5.099: Red Keycard)

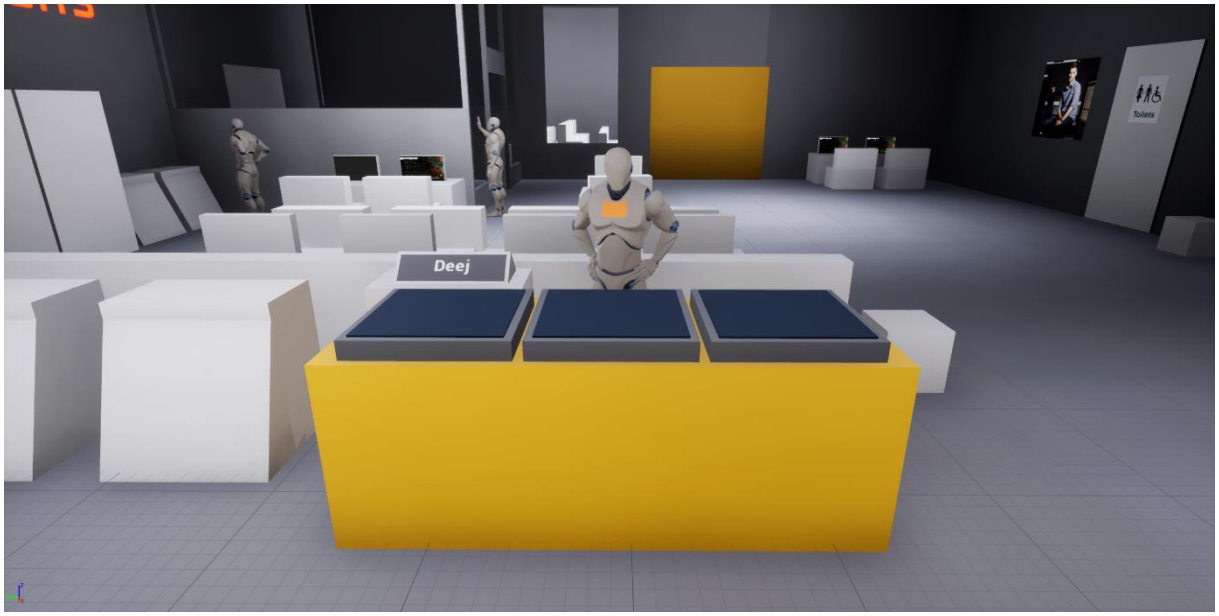
Inside the campus building, the player encounters Deej, who assigns the main task here to locate three student essays misplaced within the building. This quest leads players through various parts of the building, promoting exploration and interaction with the environment. Maintenance bots and a robot named Sharon, who can also discuss her speciality, add depth to the interactions. The first student essay is located in a meeting room in the corner. On opposite sides of the room there are also doors leading to a computer lab and lecture theatre. Figures 5.100-5.104 show the interior of the building, robots, and relevant quest locations.



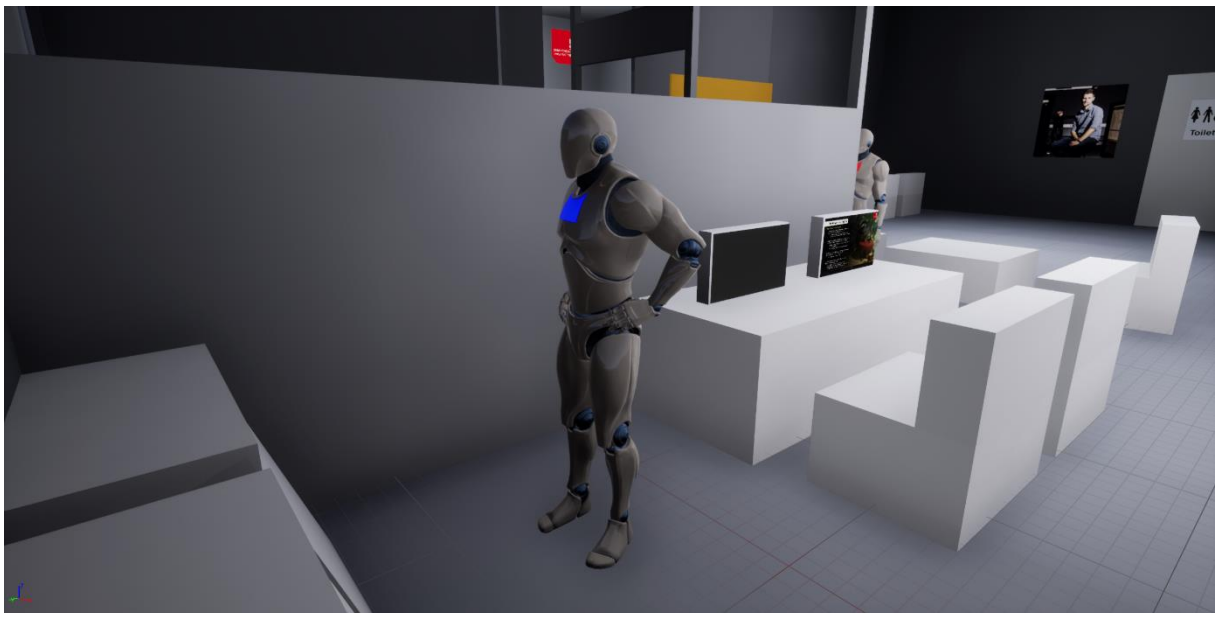
(Figure 5.100: Staffs Uni Campus – interior, south-west facing)



(Figure 5.101: Staffs Uni Campus – interior, north-east facing)



(Figure 5.102: Deej)

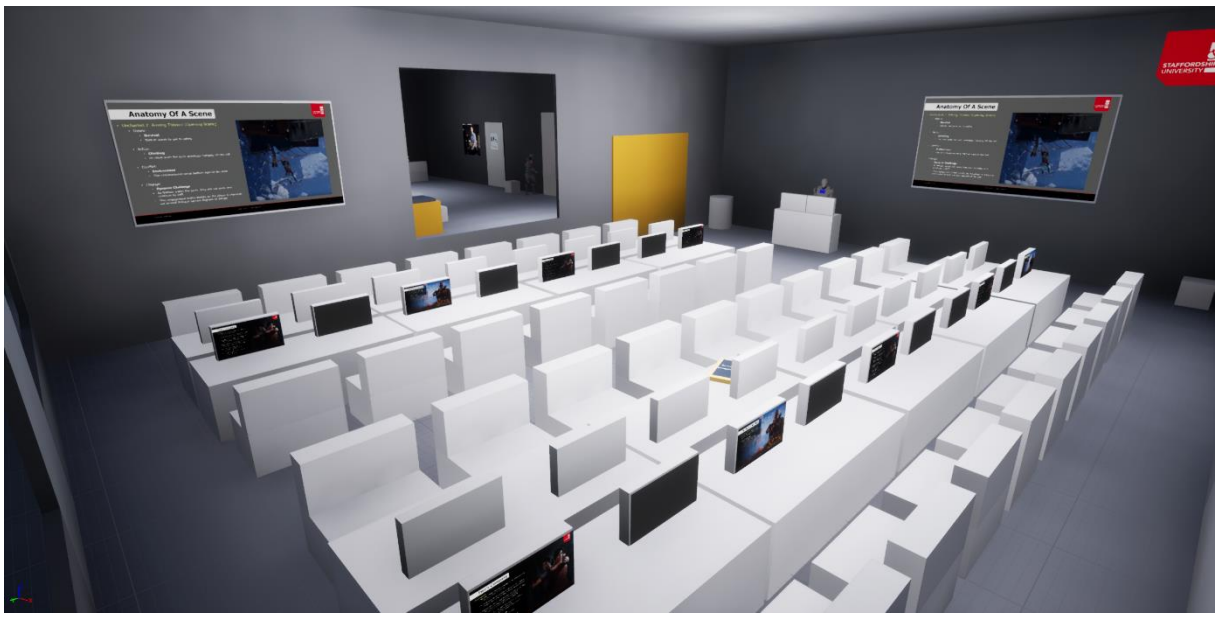


(Figure 5.103: Sharon)



(Figure 5.104: First student essay)

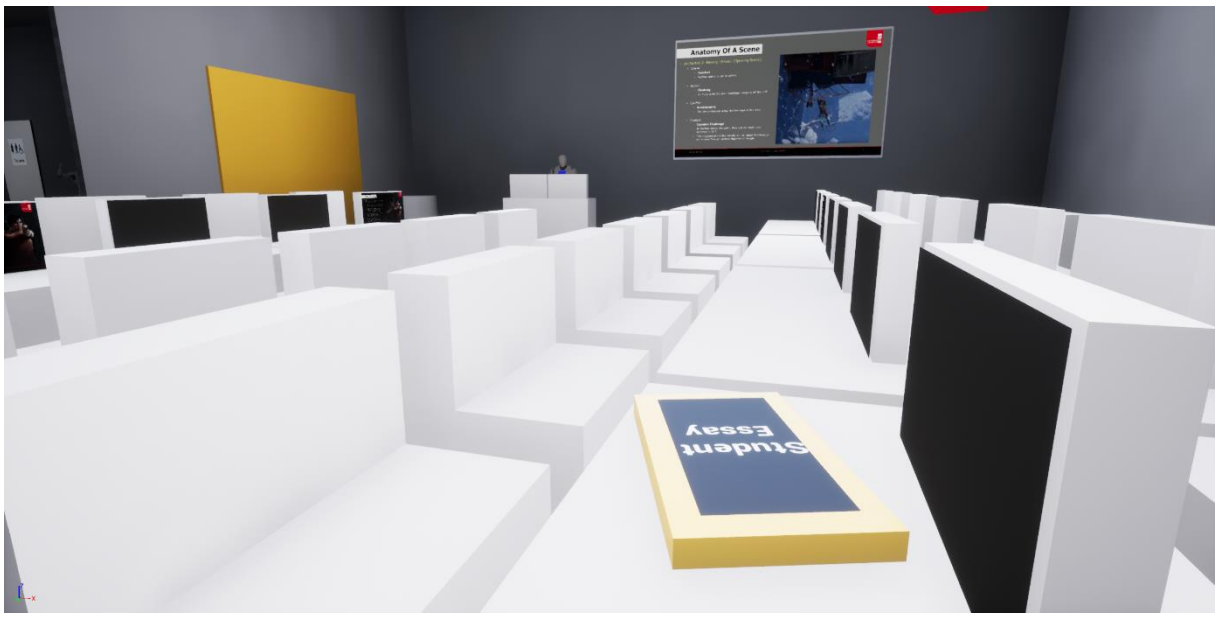
The second essay is found in the computer lab on one of the desks, and a robot named Luke is here to provide further interactive opportunities. The third essay is positioned at the back of the lecture theatre, where another robot in the room, Esther, is available for additional dialogue and interaction. Figures 5.105-5.110 show the computer lab and lecture theatre locations, along with Luke, Esther, and the remaining essay locations.



(Figure 5.105: Computer Lab)



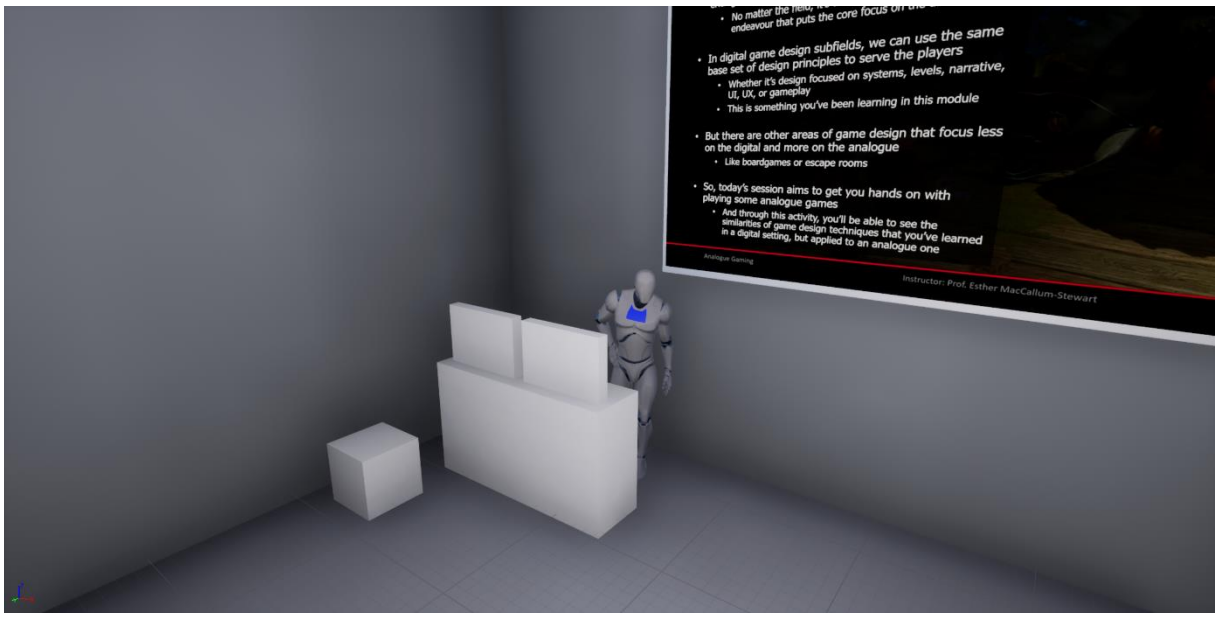
(Figure 5.106: Luke)



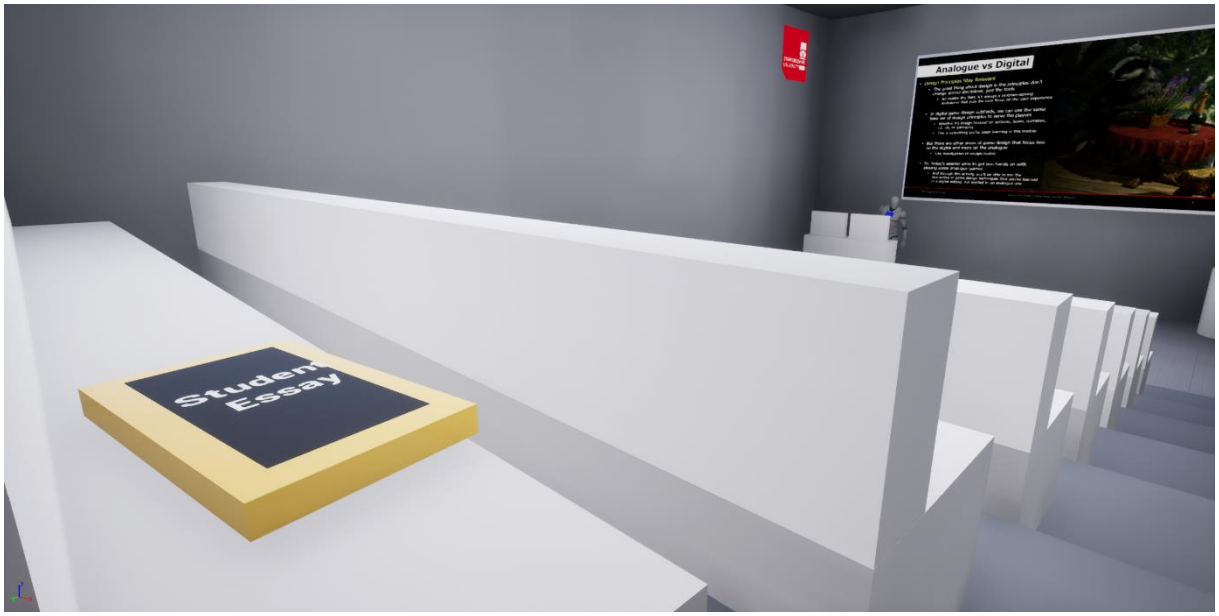
(Figure 5.107: Second student essay)



(Figure 5.108: Lecture Theatre)



(Figure 5.109: Esther)



(Figure 5.110: Third student essay)

Overall, the level design across the various districts of the experimental game effectively supports the overarching narrative and enhances player engagement through a series of thoughtfully crafted environments and interactive challenges. Each area, from the Administration District to the Staffordshire University Turing Campus, is designed to provide a unique experience that aligns with the game's themes of decline, technological interaction, and communication.

The Administration District serves as the gateway to the game, introducing players to the fundamental mechanics and the broader narrative of a robotic colony striving for maintenance. The progression into areas like the Staffordshire University Turing Campus enriches the player's experience with educational elements and deeper narrative layers, reflecting the colony's past ambitions and current desolation. The Shopping District and Cosmic Market Exchange offer dynamic interactive environments where commerce and social interaction once thrived, challenging players with tasks that require communication and problem-solving.

Moreover, the detailed integration of various NPC types adds depth to the gameplay. These characters not only guide the narrative but also provide educational and emotional engagements that resonate with the player's task of repair and discovery.

On the whole, the level design within the game is not merely a backdrop but a character in its own right, rich with stories and challenges. It compels players to explore, interact, and think critically about the space and the beings that inhabit it. Through thorough design, the game achieves a delicate balance between guiding the player and allowing them the autonomy to discover and influence the game world, making each interaction meaningful and each discovery a step toward unravelling the deeper narrative themes. This considered level design ensures that players are continuously engaged, challenged, and immersed in an open world.

G. Additional Interaction Considerations

- **Input Controls**

  The design of input controls within the game is an essential aspect of HCI, ensuring that players experience a harmonious and intuitive interface. This section outlines the standard control approaches employed for first-person gameplay on PC, utilising a keyboard and mouse setup to offer precise and responsive interaction mechanisms.

For navigating the main menu system, the controls are straightforward and are designed to align with common user expectations for desktop interfaces. The specific inputs and their corresponding in-game responses are shown in Table 5.03, as follows:

Input	In-Game Response
Left Mouse Button	Interacts with menu widgets
Keyboard keys	Enters information into text boxes

(Table 5.03: Input Controls for Main Menu System)

During the core gameplay, outside of specific minigame mechanics, the controls expand to facilitate comprehensive movement and interaction within the game environment, as shown in Table 5.04:

Input	In-Game Response
W	Moves character pawn forward
A	Strafes character pawn left
S	Moves character pawn backward
D	Strafes character pawn right
Shift (hold)	Increases character speed during movement
Spacebar	Causes the character pawn to jump
Enter	Toggles the interaction focus on the chatbox
Esc / Tab	Toggles the pause menu
E (hold)	Allows verbal input to highlighted NPC
R (hold)	Resets conversation history of highlighted NPC
F	Interacts with the highlighted object
Keyboard keys	Enters information into chatbox when toggled on

(Table 5.04: Input Controls for Core Gameplay)

During specific scenarios such as the Assembly Workshop and the Calibration Lab, the controls are tailored to the needs of these environments, and are detailed in Table 5.05:

Input	In-Game Response
E (hold)	Allows verbal input to maze NPC
Enter	Toggles the interaction focus on the chatbox
Keyboard keys	Enters information into chatbox when toggled on

(Table 5.05: Input Controls During Assembly Workshop & Calibration Lab scenarios)

The controls for navigating the pause menu are designed to be intuitive and are detailed in Table 5.06. These controls allow players to bring up a reminder of the control scheme, and offer players the option to leave the game as follows:

Input	In-Game Response
Left Mouse Button	Interacts with menu widgets

(Table 5.06: Input Controls During Pause Menu)

Overall, the input control design is structured to ensure that players can interact with the game efficiently and effectively. It matches a conventional control scheme that is familiar to first-person games played on PC and has a clear focus on enhancing the player's immersion and responsiveness to the game's interactive demands. By providing a consistent and intuitive control scheme, the game facilitates a smooth player experience for maintaining player involvement and satisfaction.

- **UI Design**

The design of the user interface within the experimental game intentionally focuses on minimalism to enhance the player’s sense of immersion. This approach aligns with the research goal of fostering direct interactions between the player and the NPCs, rather than relying on traditional RPG elements that might otherwise mediate this interaction. By avoiding conventional UI components like quest logs, maps, and supplemental information pages, the game encourages players to engage with the game world and its inhabitants, gaining necessary information and progressing through the narrative organically. That said, UI elements do exist as part of the menu systems, as well as during the gameplay where diegetic, non-diegetic, and spatial objects

are primarily utilised.

While traditional RPG UI elements are minimised, UI components are incorporated within the menu systems to support game functionality without detracting from the immersive experience. These elements are carefully integrated into both the main menu and the pause menu, providing necessary game controls in an unobtrusive manner.

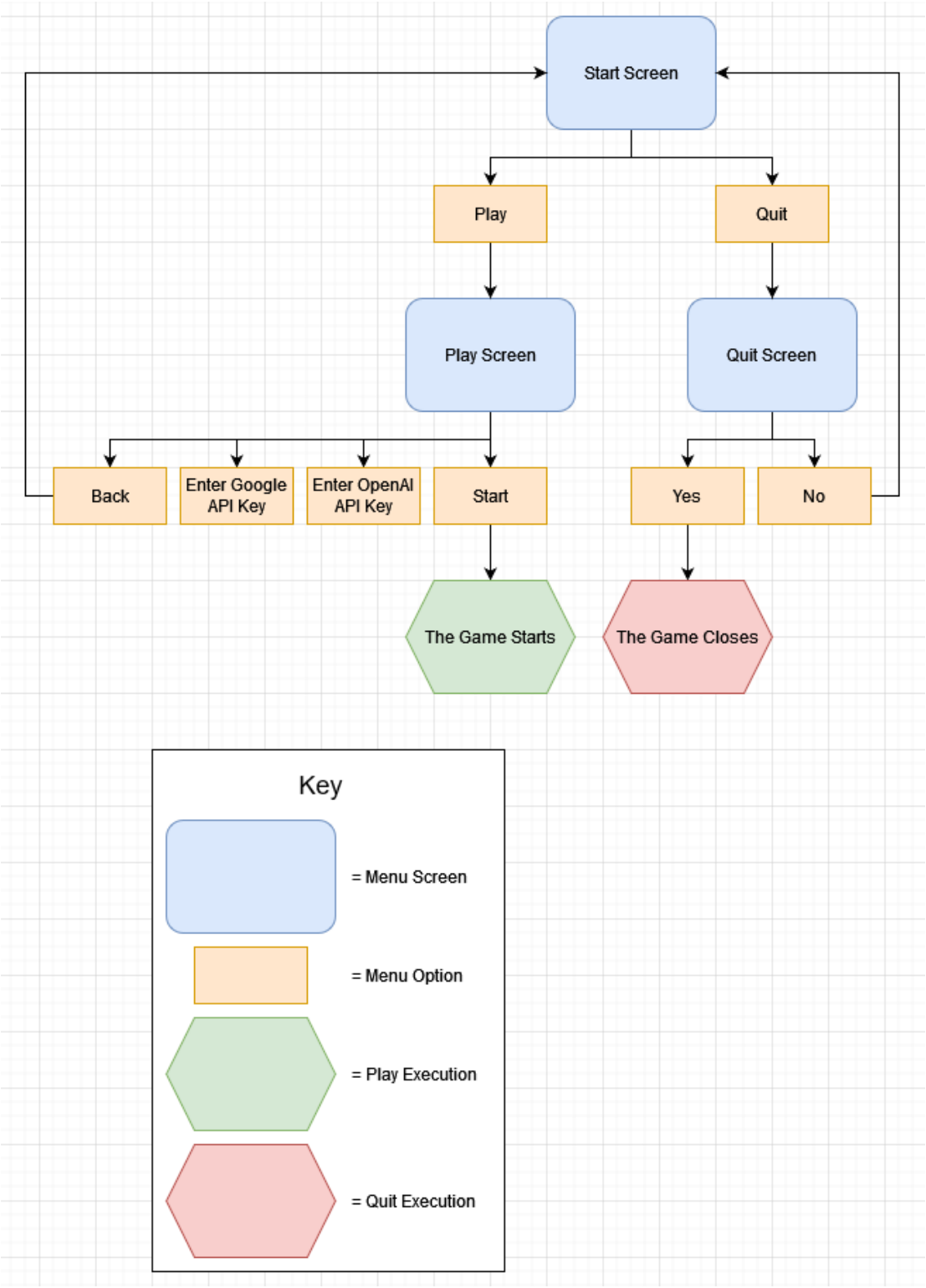
Diegetic UI elements are integrated into the game world itself and are visible to both the player and the character. For instance, interactive screens or devices that the character can use within the game environment, which display information relevant to the current context or task.

There are also non-diegetic UI elements that are not part of the game world and are only visible to the player. They include heads-up displays (HUDs) and other interface elements that provide critical game status information without existing within the game space.

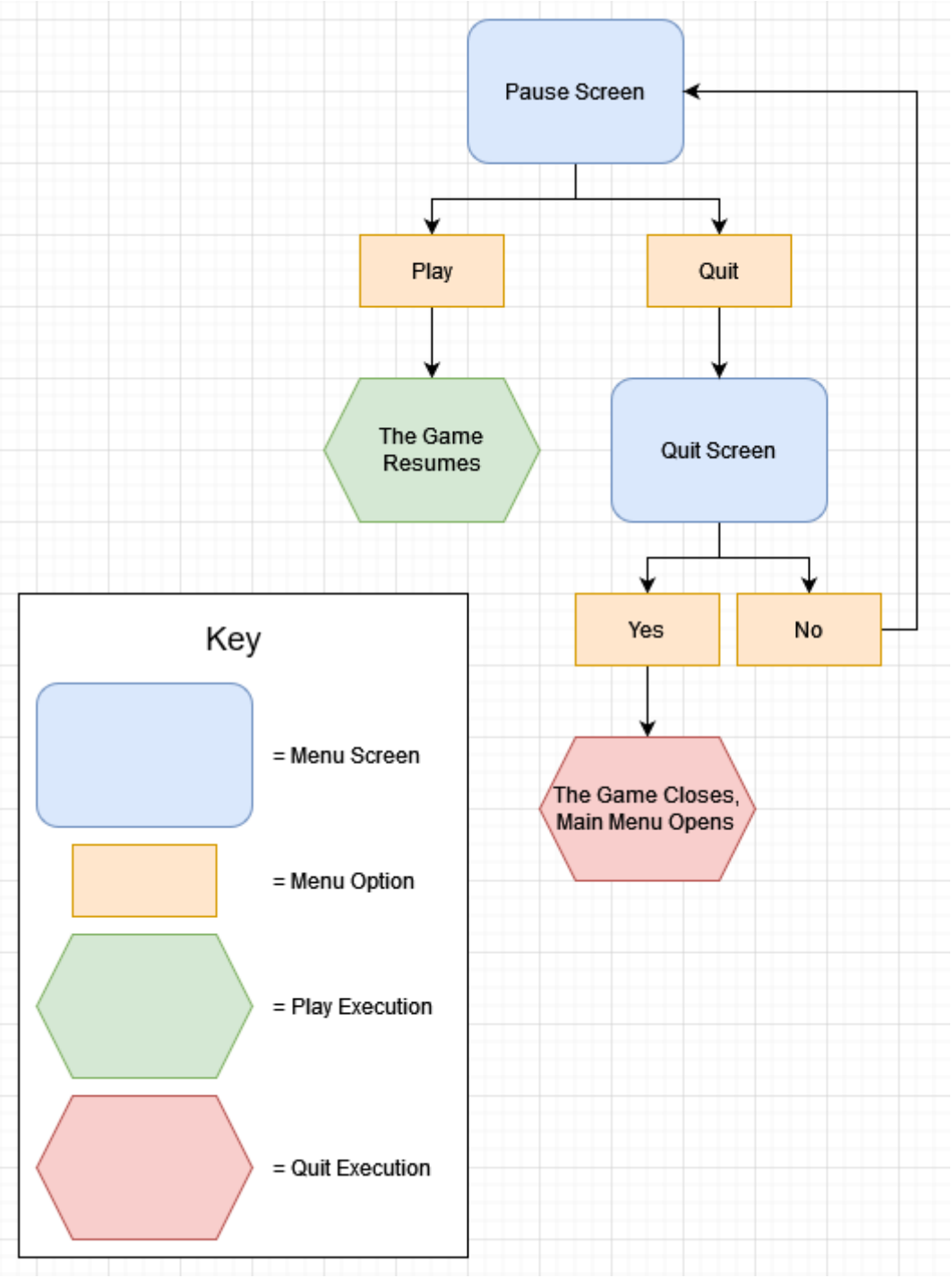
Additionally, spatial UI elements exist within the game world and are oriented in the game space but are only visible to the player. Examples include highlighted objects or interactive icons that appear in front of NPCs.

More details on the specific use cases of these different UI styles will be provided further below.

To begin with the design rationale, an information architecture (IA) was created. The IA for the UI is important to ensure that even the limited use of on-screen displays remains intuitive and enhances the gaming experience without overwhelming the player. Figures 5.111 and 5.112 detail the IA for the main menu and pause menu systems, respectively. These Figures illustrate the structured layout and flow of the menu systems, ensuring that players can navigate the game's options easily and efficiently. This strategic arrangement of UI elements helps maintain a clean and accessible interface, supporting the game's immersive qualities while providing essential interaction capabilities.



(Figure 5.111: Information Architecture – Main Menu)



(Figure 5.112: Information Architecture – Pause Menu)

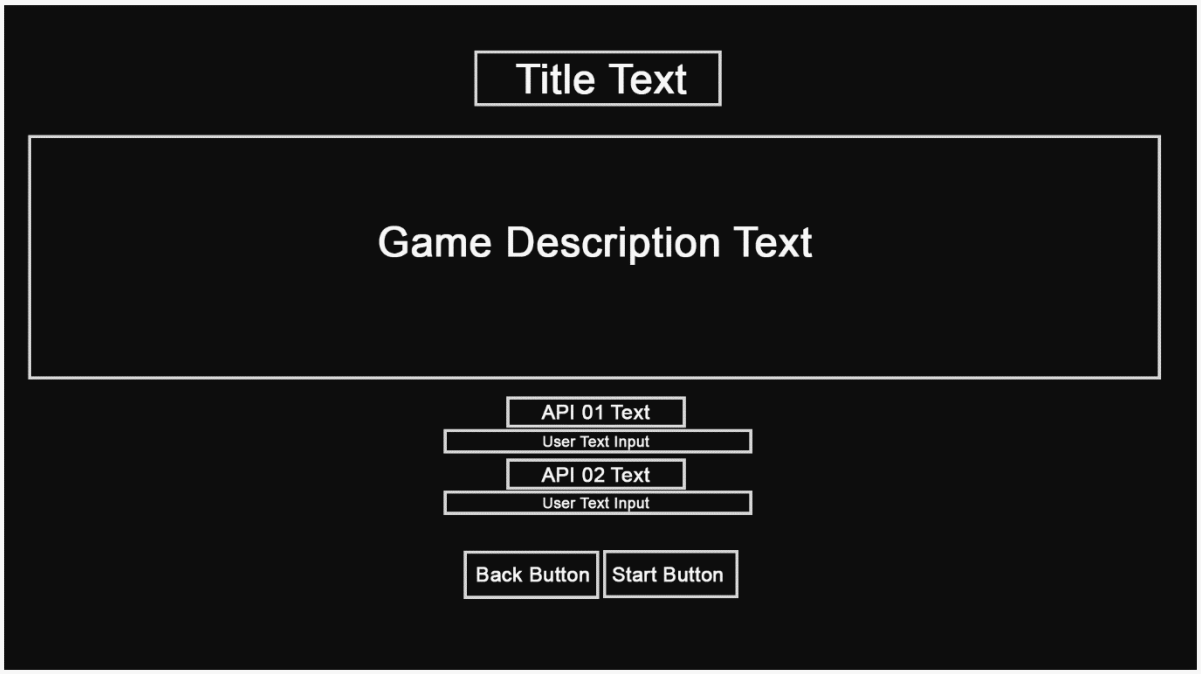
Building upon the foundational concepts established in the IA diagrams, wireframe designs were developed to visually represent how the information is presented to the user within the game. These wireframes offer a detailed blueprint of each screen's layout and functionality, to ensure the UI is both clear and aligned with the game's overall gameplay objectives.

The main menu system's wireframes were designed to ensure that players receive a consistent and defined introduction to the game’s options. Figure 5.113 shows the main menu landing screen, which illustrates the initial view presented to players when starting the game.



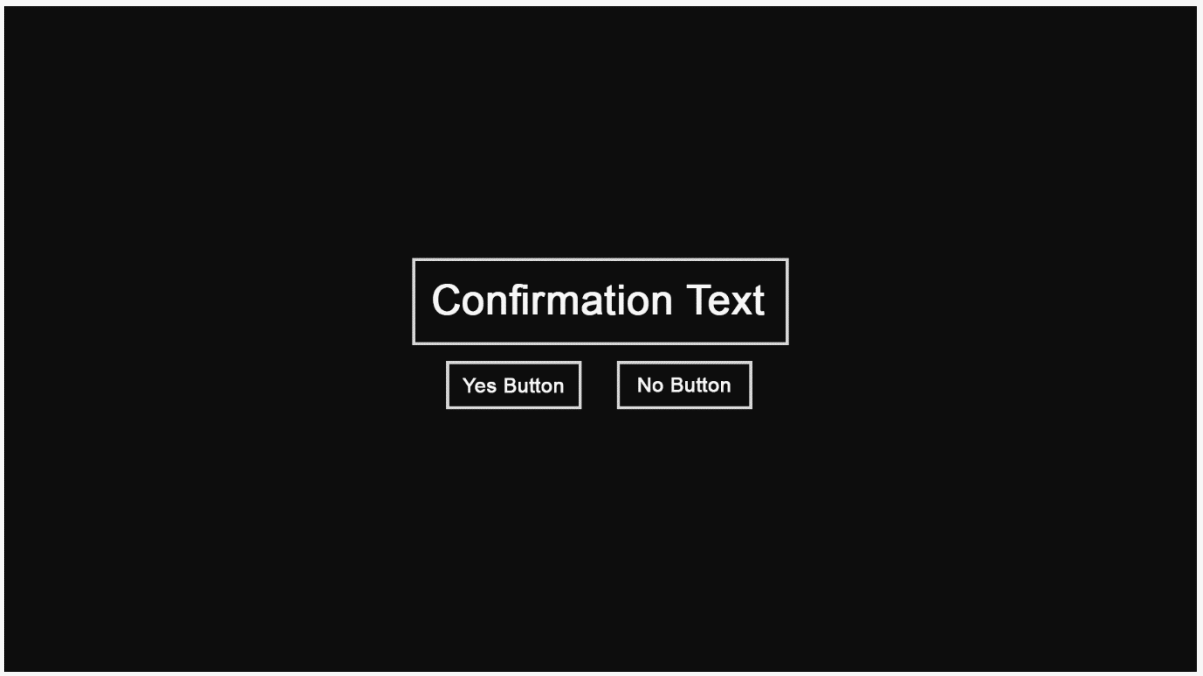
(Figure 5.113: Wireframe – Main Menu Landing Screen)

Figure 5.114 shows the main menu’s play screen wireframe, which focuses on the setup information for starting the game as follows:



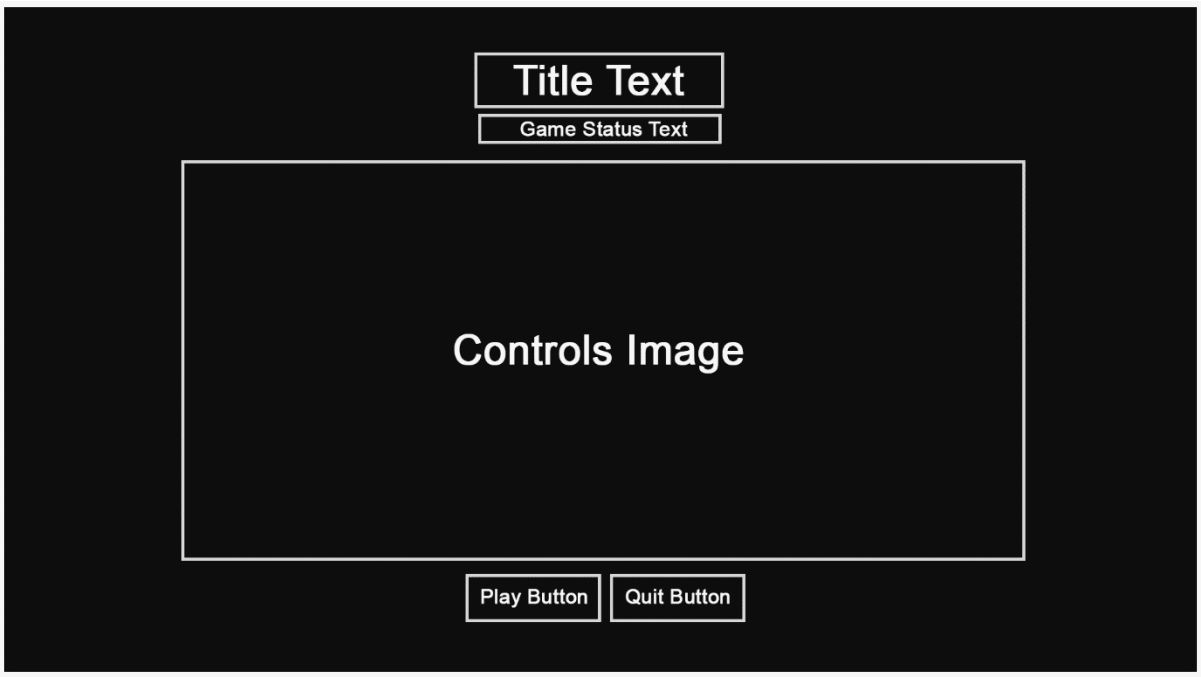
(Figure 5.114: Wireframe – Main Menu Play Screen)

Next is the main menu's quit screen wireframe. This presents the layout available when a player chooses to take the pathway to exit the game. This screen is designed to confirm the player's intent to quit, minimising accidental game closure as shown in the following Figure 5.115:



(Figure 5.115: Wireframe – Main Menu Quit Screen)

Similarly, the pause menu system was also concepted into design wireframes. Figure 5.116 shows the concept for the pause menu landing screen as follows:



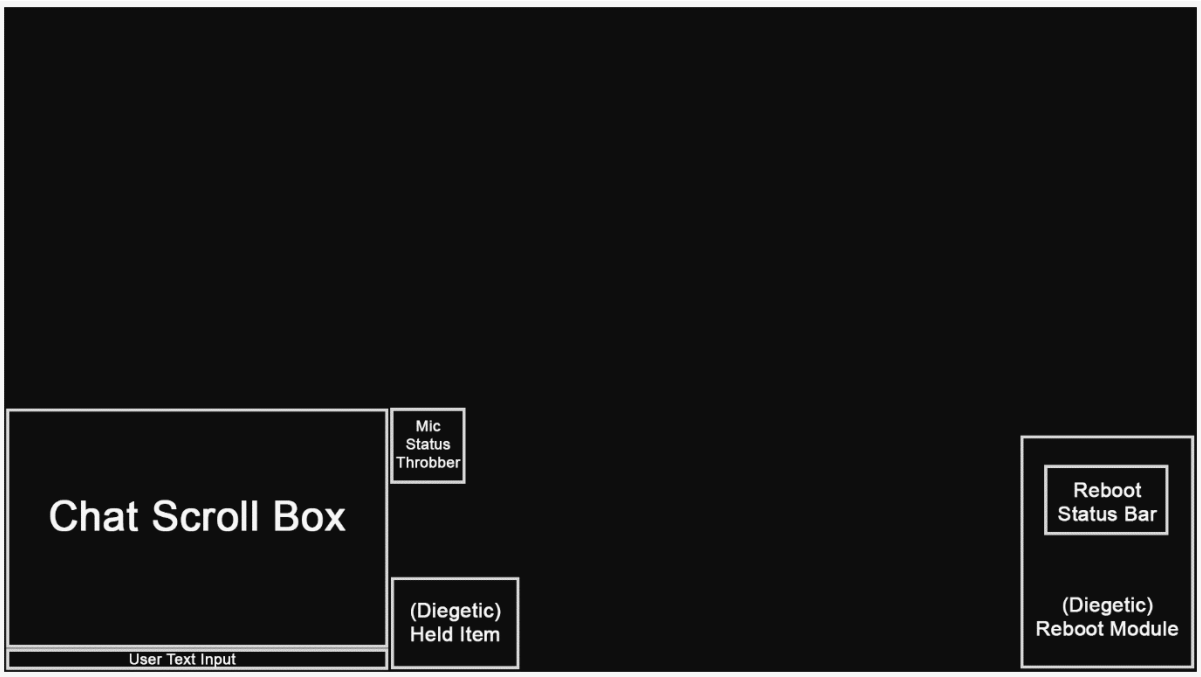
(Figure 5.116: Wireframe – Pause Menu Landing Screen)

Additionally, Figure 5.117 shows the quit screen within the pause menu as follows:



(Figure 5.117: Wireframe – Pause Menu Quit Screen)

Furthermore, Figure 5.118 presents a wireframe that was also designed to represent the player's HUD during standard gameplay. This wireframe aimed to include minimalistic design choices that support gameplay without overwhelming the player with information.



(Figure 5.118: Wireframe – Player's Heads-up Display)

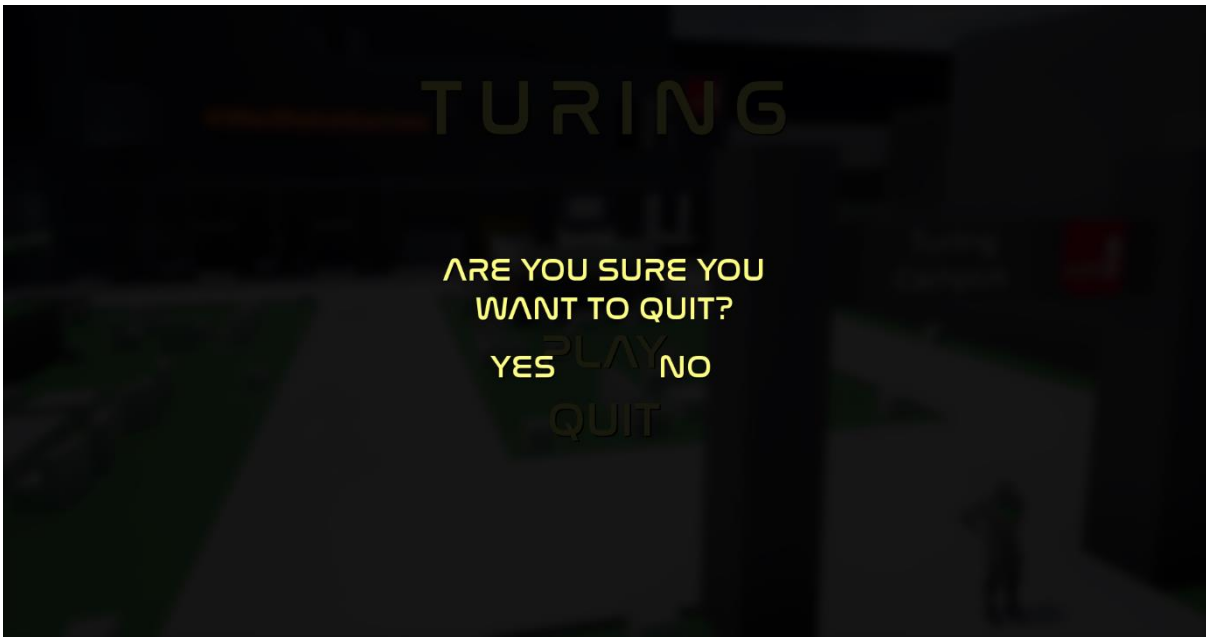
Following the development of the IA and wireframe designs, the final implementation of the UI in the experimental game is refined to ensure clarity, functionality, and aesthetic consistency. The UI design takes into account a commitment to a user-friendly and minimally intrusive interface that will be explained at this point moving forward.

Beginning with the main menu landing screen, Figure 5.119 features a simple layout with button options that allow the player to take a path towards playing the game or exiting the application. This screen sets the tone and serves as the first point of interaction between the player and the game. The interface is non-diegetic, appearing as a layer over the game environment, which in this case is a panning background image of the Staffordshire University Turing Campus from within the game's setting. The screen also includes a prominent title header displaying the game's name.



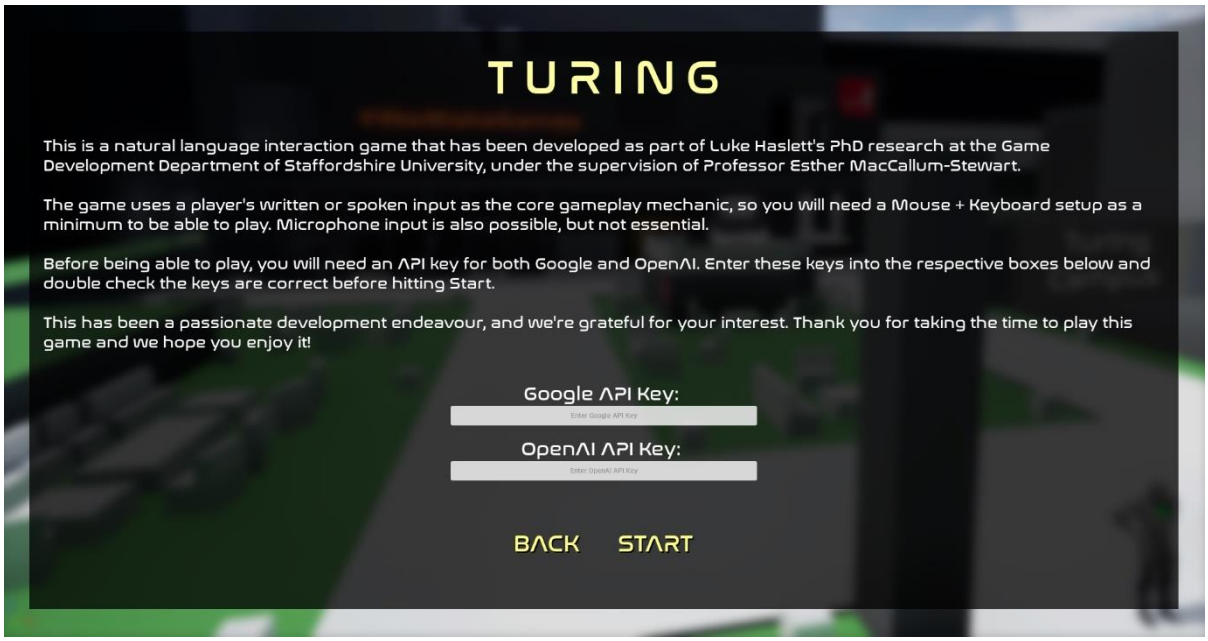
(Figure 5.119: Experimental Game – Main Menu Landing Screen)

The quit screen within the main menu is designed to ensure that the player's decision to exit the game is deliberate and confirmed. It features warning text that prompts the player to confirm their choice, accompanied by two buttons: one to execute the decision and another to cancel, allowing the player to easily back out if the selection was accidental. This design consideration mitigates potential errors in navigation, as shown in the following Figure 5.120:



(Figure 5.120: Experimental Game – Main Menu Quit Screen)

The main menu play screen, shown in Figure 5.121, is an essential component of the main menu, designed to inform the player about the game and prepare them for entering the game world. It presents a large informational text box detailing the experimental nature of the game, including guidance on necessary peripherals and API integrations. Importantly, this screen also includes fields for the player to input API keys for the services used in the game, such as OpenAI's ChatGPT and Google's STT APIs. A back button allows users to return to the main landing screen if needed, while a play button starts the game. Additionally, if API input fields are left blank, a warning message alerts the player that they must enter the required data to proceed, ensuring all necessary configurations are set before gameplay can initiate.



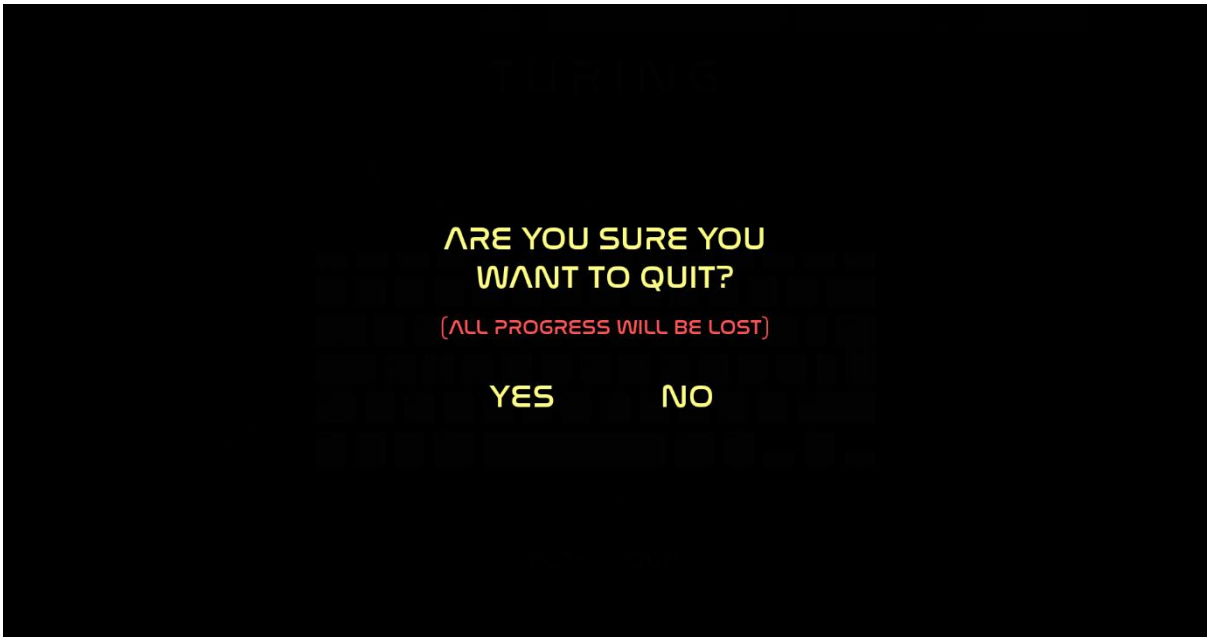
(Figure 5.121: Experimental Game – Main Menu Play Screen)

Figure 5.122 shows that the pause menu landing screen is designed to be immediately informative. A large portion of the screen displays an image outlining the control inputs, serving as a useful reminder to recall key commands upon resuming the game. Additionally, the screen includes a play button that returns the user directly to the gameplay and a quit button that puts the player on a path towards exiting the game. This design ensures that players have quick and easy options to either resume their game or start the exit process, depending on their needs.



(Figure 5.122: Experimental Game – Pause Menu Landing Screen)

Similar to the main menu quit screen, the pause menu quit screen is designed to ensure that the player's decision to exit is intentional, as shown in Figure 5.123. It features warning text that asks players to confirm whether they want to continue to leave the game and return to the main menu. Importantly, it includes a caution that exiting to the main menu may result in the loss of any progress they have made during gameplay. This additional information is important as it helps prevent frustration from accidental game exits and potential loss of progress. The screen contains two buttons: one to execute the decision and another to cancel, providing clear choices and preventing unintended actions.



(Figure 5.123: Experimental Game – Pause Menu Quit Screen)

Additionally, when the pause menu is active, the gameplay itself temporarily suspends in the background until the pause menu is closed. These screens within the Pause Menu are important to the game's UI, balancing the need for quick access to game input controls with the importance of preventing unintended disruptions to the gaming experience.

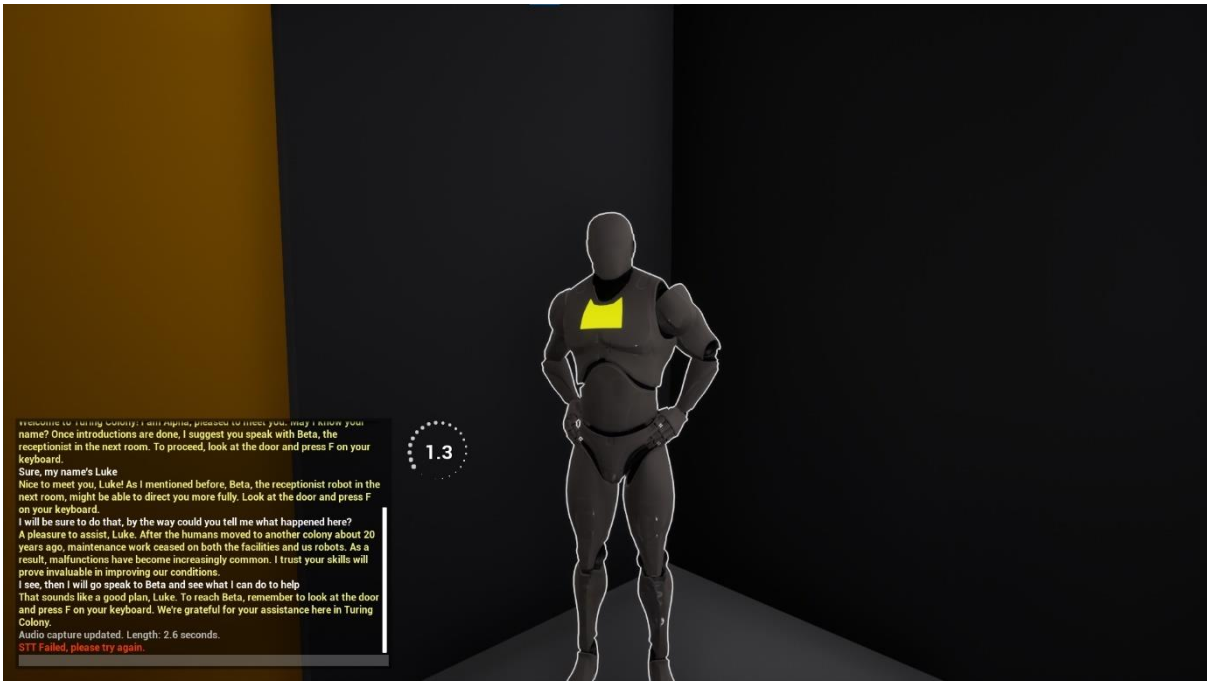
As a key interface, the HUD appears overlayed on the game screen and includes several essential features to support communication and interaction within the game. Firstly, the HUD features a persistent chatbox window that displays a short-term log of recent interactions, capturing both player inputs and NPC responses. This log helps players track the flow of current conversations, which is particularly important in a game that emphasises character interaction. Primarily, it is an accessibility feature in case the player can not hear the audio properly, but also it is limited in how much it can display to avoid player’s from relying on it completely.

Below the chatbox is a text input bar, which enables the player to type and preview their responses or queries before committing them to the conversation. This supports thoughtful communication, allowing players to consider and refine their inputs whilst also providing them with the ability to

communicate in a written way in case their level of accessibility prevents them from communicating verbally.

Adjacent to the chatbox, a throbber activates when the player holds down the designated key for verbal input, providing visual feedback that the voice input is currently live. The throbber deactivates upon the release of the key, signalling the end of the input recording. This UI element also includes a numerical counter that increments to indicate the duration of the current verbal input, helping players manage the length of their spoken contributions effectively.

The integration of these non-diegetic elements in the HUD is important for supporting gameplay fluidity and enhancing the player experience. By providing clear, contextual information through the chatbox and input bar, alongside interactive feedback via the throbber and its counter, the HUD plays a significant role in helping player-NPC interactions. These UI components ensure that players stay fully integrated into the game's narrative while managing the technical aspects of communication inputs smoothly and intuitively.



(Figure 5.124: Experimental Game – Player's Heads-up Display)

During gameplay, spatial UI styles are also utilised to play a beneficial role that improves player navigation and interaction within the environment. Spatial highlighting visually distinguishes interactive objects by rendering them with coloured outlines when the player faces them and fades these highlights when the player looks away. This method aids in guiding the player's attention to potential interactions.

The colour scheme for spatial highlighting is designed to convey the functionality and relevance of interactive objects within the game, including NPCs, key items, and aspects of level dressing such as doors and monitors. For instance, a red highlight indicates non-interactivity, signalling to the player that the object cannot be interacted with at that point in the game. Orange highlights denote objects that are core to a quest, guiding players towards critical interactive opportunities. Green highlights suggest a secondary connection to a quest, potentially offering additional information about a quest. Yellow highlights provide supplemental information, useful for enhancing understanding or offering background context to the narrative world. Blue highlights indicate limited information availability, enhancing the player's experience without being central to quest progression. Lastly, white highlights show that an object, while not linked to any specific quest or narrative element, is still interactable, offering general engagement within the game space.

Figure 5.125 illustrates this spatial highlighting in action. These show how different colours are utilised to effectively guide player decisions and interactions in real-time, ensuring that players can make informed choices based on the visual cues provided.



(Figure 5.125: Spatial Highlighting of Door During Gameplay)

Another example of spatial UI implemented within the game is the NPC Throbber. This UI element appears directly in front of an NPC's chestplate when the system is processing a conversational interaction. The inclusion of this throbber is essential due to the technical lag that can occur between player input and NPC output, which might lead players to mistakenly believe that the feature is malfunctioning. To mitigate potential confusion and maintain user engagement, the throbber serves to visually indicate that the player's input has been acknowledged and that a response is actively being generated.

Next, the integration of diegetic UI styles within the gameplay will be detailed, focusing on how these elements naturally blend into the game environment to enhance player interaction without breaking immersion. A prime example of diegetic UI is the reboot module, which becomes a persistent element on the player's screen space following its acquisition in the introductory tutorial. For clarity, the module is clearly labelled with its name, and it includes a small vertical bar that visually represents the temporal status of the player's action to reboot a target NPC, as depicted in Figure 5.125.

Furthermore, as shown in Figure 5.125, when the player currently holds an

item, it appears adjacent to their chatbox on the screen. Each item is labelled with its name to aid players in quickly identifying it and understanding its relevance to their current quests. This method of item display ensures that players can easily manage and utilise their inventory without needing to navigate away from the main gameplay view.

Additionally, Figure 5.125 illustrates the use of colour-coded chest plates on NPCs, which are fundamental diegetic UI elements that indicate each NPC's function and interaction status. These chest plates change colour depending on the NPC's role and their current state of interaction. For example, when an NPC is actively speaking, the chest plate flickers between yellow and orange, visually showing the player the source of dialogue, which is particularly useful if the player's attention is not currently directed at the NPC. This feature is especially important for maintaining spatial awareness and narrative coherence during interactions. When not actively engaged in dialogue, the chest plate displays a static colour that signifies the level of conversational capability the NPC possesses, Red indicates no conversational capabilities, orange signifies essential conversational capabilities integral to a quest, green denotes capabilities related to a core quest, yellow suggests general conversational abilities, and blue indicates limited conversational capabilities.

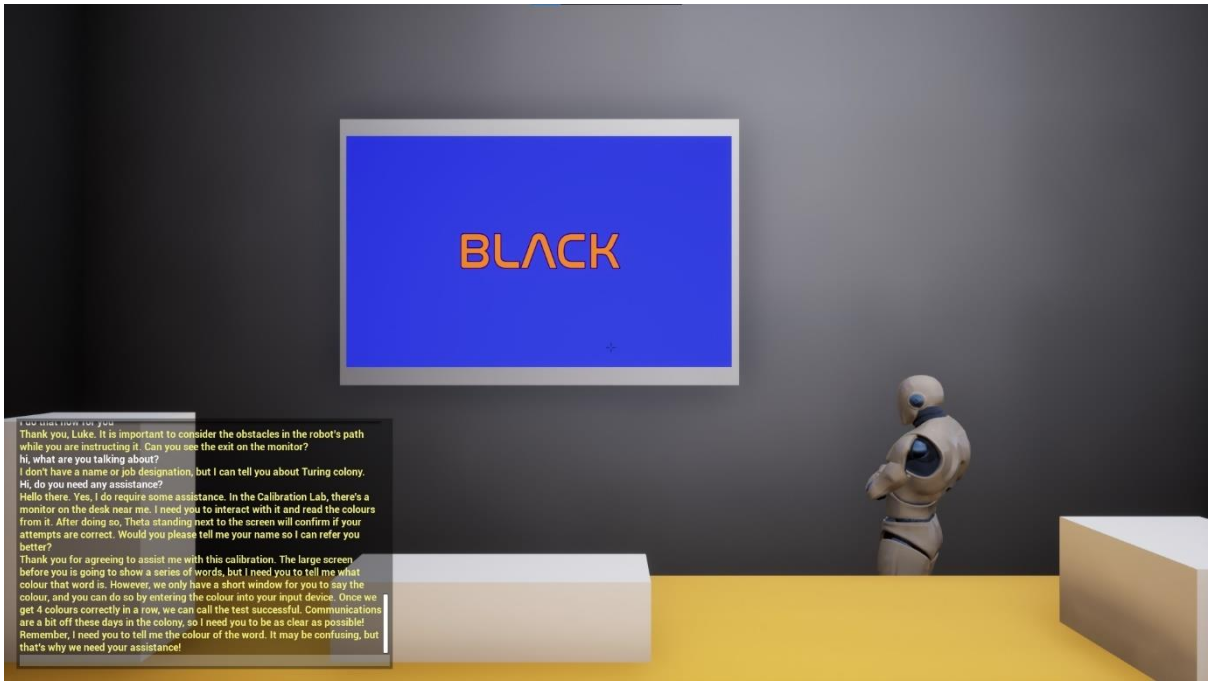
Another diegetic element within the experimental game is the NPC nameplates that utilise a text element attached to an asset. As depicted in Figure 5.126, these nameplates provide a piece of environmental context, enabling players to identify key NPCs throughout the game at a glance. This design assists in player navigation by clearly marking important characters within the game's environment.



(Figure 5.126: NPC Nameplates)

Also illustrated in Figure 5.126 is an example of the interaction monitors used for launching specific game mechanics like those in the Assembly Workshop and Calibration Lab. These monitors incorporate a text element and integrate functionality within the game world.

The Calibration Lab itself features a diegetic screen on the wall, crucial for the gameplay mechanics associated with these buildings. As seen in Figure 5.127, this screen includes a text element within a fixed background border that alternates through a series of colours, as defined in the previous mechanic’s section. This dynamic visual cue supports the lab activities and provides players with the necessary information feedback in real-time.



(Figure 5.127: Calibration Lab Screen)

Additionally, Figure 5.128 showcases a noticeboard placed within the open area of the game world. This board contains a text element affixed to an asset, offering information about a side quest. The text updates automatically to track and display the player's progress, providing a live update of quest status in a visually incorporated format.



(Figure 5.128: Noticeboard)

Environmental signage also plays a significant role in aiding player navigation and enhancing the thematic setting. As shown in Figure 5.129, these signs include text elements scripted with an emissive colour material, which increases visibility and clarity, guiding players as they traverse the game world and seek specific locations or buildings.



(Figure 5.129: Emissive Environmental Signage)

For key items used in quests, as shown in Figure 5.130, these items are not only highlighted spatially as previously mentioned but also include a text element attached to the asset that clearly labels the item. This labelling assists players in easily identifying quest-relevant items, reducing confusion.



(Figure 5.130: Interactive Items)

Finally, as part of the environmental narrative, 2D images are placed throughout the game space to add narrative flavour to the scenes, supplementing the game's story with visual applications as illustrated in Figure 5.131. These images contribute to the overall ambience and help to further immerse players in the game's thematic environment.



(Figure 5.131: Environmental Imagery)

Overall, the UI design across all sections of the experimental game balances functionality with minimalism, developing the immersive experience while maintaining HCI principles with a strong focus on user-friendly interactions. This approach not only improves the gameplay experience but also aligns with the game's research goals to explore effective communication between players and the game environment, ultimately facilitating a high standard for UI design in interactive narratives.

- **UX Design**

  The UX design of the experimental game is carefully designed to complement player engagement through positive, informative, and expected interactions. This approach ensures that each element of the game contributes to a seamless and enjoyable gameplay experience, aligning with the narrative and aesthetic goals of the game.

  Typography within the game uses two distinct fonts: Roboto and Nasalization. Roboto, a default font included in the Unreal Engine development package, offers clear, readable sans-serif lettering that maintains legibility across various game interfaces. Nasalization, inspired by the NASA logo, complements Roboto with its thematic resonance, invoking notions of science, futurism, and space exploration. The choice of these fonts reflects the game’s setting and theme, reinforcing the narrative through visually coherent text presentations that are both functional and thematically appropriate.

  To build on the dynamic quality of the game's interface, smooth UI animations are integrated throughout. These animations include a panning background in the main menu, text elements that fade in to focus, and camera transitions that fade to and from black during specific gameplay moments, such as during tasks in the Assembly Workshop and Calibration Lab. These subtle yet effective animations contribute to a conventional video game experience, providing visual feedback that is both pleasing and informative, helping to guide the player’s interactions without detracting from the immersive environment.

  Further enhancing the realism and dynamism of the game world, NPC body

animations are incorporated through an asset pack sourced from the Unreal Marketplace, specifically the Generic NPC Anim Pack. These animations are tailored for the default character model used in the engine, offering a variety of simple idle movements that NPCs perform while stationary. This inclusion improves the visual environment, providing players with realistic character behaviours that add interest to the game setting. By animating NPCs in such a naturalistic manner, the game not only increases the visual appeal but also develops the immersive quality of the player's interactions, making the game world feel more alive and engaging.

Together, these example elements of UX design, from thoughtful typography and engaging animations to realistic NPC behaviours, form a cohesive design that significantly enhances player interaction and satisfaction. This approach ensures that every aspect of the game's interface and character design works in harmony to create a compelling, immersive, and visually coherent experience that resonates with the themes of science and exploration central to the game's narrative.

- **Audio**

  Lastly, audio design plays another essential part in heightening the immersive quality within the experimental game. Sound elements are tailored to accompany the visual aesthetics and interactive dynamics of the game, which helps foster a cohesive sensory environment for engaging players.

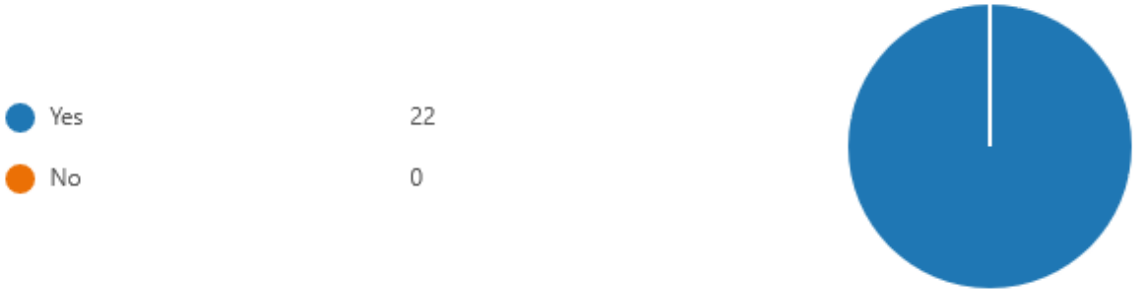
  An example is the distinctive sounds used for interaction cues, such as the clicking of UI buttons or varying tones when interacting with different objects in the game world, providing immediate feedback to confirm player actions. This affirms the action and builds a tactile feel for interactions.

  Another example is the plain employment of elevator music during the level transition from the tutorial area, helps build the atmosphere without overpowering the gameplay, subtly reinforcing the narrative and mood transitions between game sections. Meanwhile, ambient sounds like an intermittent flickering lightbulb also contributes to the setting's ambiance, adding realism and narrative metaphor.

4. Experiment Results Data

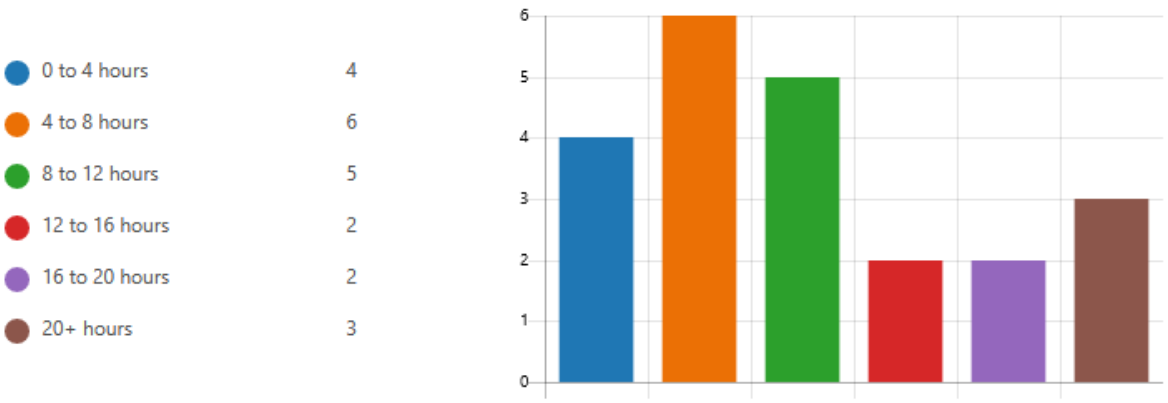
A. Section 01: Preliminary Questions

4. Do you play video games?



(Figure 6.01)

5. If yes, how often do you play per week?



(Figure 6.02)

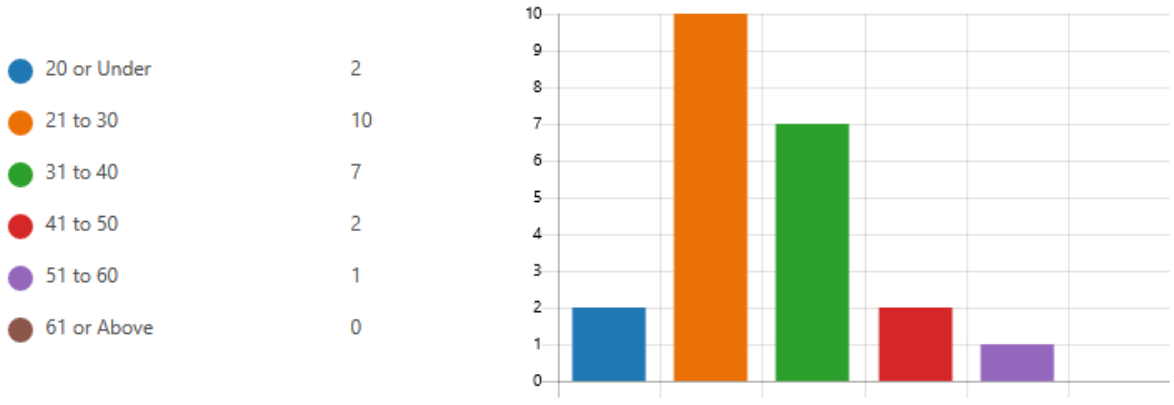
6. List the game genres you mostly play.

1	JRPG, RPG, Adventure, Action.
2	first person shooters, puzzlers, adventure
3	Single player RPG, Racing, MMO Shooter
4	Puzzle platformers, Mobile puzzle games, co-op fighting games
5	Racing, Third Person Action / Shooter / Adventure, Multiplayer (even though not technically a genre), builder / rts.
6	Puzzle, adventure, factory, rpg, builder, power wash
7	roguelikes, open world RPGs, sandboxes
8	Colony Sims, FPG, RPG, RTS, Sandbox
9	High Fantasy MMORPG

	MOBA Turn-Based RPG
10	RPG and Multiplayer Online
11	Action, Adventure, RPG, Simulation, Card, Tabletop, Roguelike, MMORPG
12	Indie, simulation, action, adventure, open-world
13	Rogulike/lite, Action Adventure, RPGs, Strategy.
14	- Action RPGs - Shooters - Battle Royale - Action Adventure - Immersive Sims
15	Dead Space, Bio Shock, Rayman legends
16	rpg, third person shooter, adventure, rogulike, open world, mmo
17	platformers, racers, fighters, occasionally games like cyber punk or alien isolaotion
18	RPG
19	Mobas, platformers, arcades
20	Fantasy (BG£, God of War, Horizon)
21	simulation, puzzle.
22	FPS, Puzzle, Retro, Space sims

(Figure 6.03)

7. What is your age group?



(Figure 6.04)

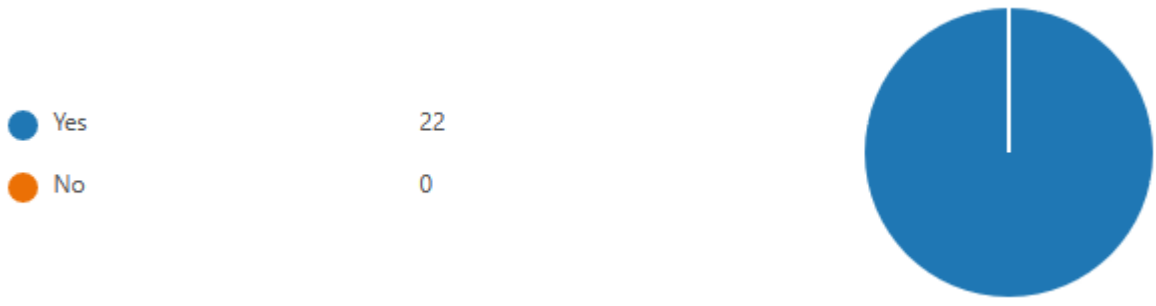
8. What gender do you identify as?

1	Male

2	Male
3	Male
4	Female
5	Male
6	Male
7	Non-Binary
8	Male
9	Male
10	Male
11	Male
12	Male
13	Male
14	Non-Binary
15	Female
16	male
17	male
18	Male
19	Male
20	Female
21	Female
22	Male

(Figure 6.05)

9. Is English your first language?



(Figure 6.06)

B. Section 02: Research Game Questions

1. What are your first impressions of the game you played?

1	I must admit I first thought it was a horror game as it had an empty tone (the breaking lightbulb also helped here). Upon first talking to the Robots, I found it surprizing how natural it felt to be interacting through speach, which I must admit was not what I expected. My first instinct was to test the boundaries of the speach, and at first glance it held up well. I think the context of narrative really helps here.
2	Interesting, lots of intrinsic motivation to find out information and explore
3	I found it intuative, it provided a basic understanding of the world but being able to ask specific questions to the NPCs to discover more was really cool.
4	Simple but aesthetically pleasant, easy to navigate, controls are easy to use and require little explanation
5	It's an interesting concept, being able to choose how you talk to the robots and address them rather than a multiple choice list was fascinating.
6	Was a fun demo and puzzles.
7	a lot more fun than i was expecting to be honest; seemed quite very well idiot proofed
8	Promising. I enjoyed that the NPCs were able to react to my dialogue.
9	Very impressive! Really interesting how the robots took the time to think about a response before sending it out, made you feel like you were in an actual conversation.
10	It was very nicely open with gameplay, felt a lot of freedom with exploring the environment.
11	The game's eerie atmosphere was intriguing at first. I was pleasantly surprised by the engaging interactions with the robots, allowing for dynamic and thoughtful conversations instead of preset options. This added depth and immersion to the gameplay, enhancing the narrative experience.
12	I felt that there was a mystery to be solved or a puzzle to be completed
13	it was very interesting interacting with the robots and having them repsond to quests I answered naturally, sometimes even to questions I didn't necessarily expect them to have a response to.
14	I really like it. It is a new and innovative approach to narrative and progressing through a game. It feels like a breath of fresh air compared to the dialogue box clicking of current industry games, as this feels like I have more control of the experience and greater impact within the world.

15	Interesting - it feels like there is more to discover and quite a lot to dig into in terms of the narrative
16	very interesting and very different to what ive seen before
17	good fun, want to find out more
18	Impressed
19	Interesting, but lacked interesting interactions I would have liked in a game where conversation s are encouraged
20	I like the interactivity of communicating with the robots. I read faster than the robots talk and so wished I could speed that up. I can see how this could be used to support RPG games.
21	I felt it was like portal, in the sense where you get started is a small space, and slowly the game builds up with more interesting factors, i love the setup.
22	Fascinating. The level of interactivity with the NPCs is astonishing. The gameplay is quite varied (given the nature of the test setup) offering different means to test features of the language models held by the various robots.

(Figure 6.07)

2. What did you enjoy about the game you played?

1	I really enjoyed the conversation and asking lateral questions. It made each interaction feel like a puzzle in itself. The responces always kept to very much on point without straying from the matter at hand. To be honest, I think a little more depth here has the potential to create some really deep and meaningful outcomes. The overall flow felt good and the robots kept me on track surprizingly well. The natural conversation was such an easy way to be able to find the next steps when confused or lost. Characters working to guide the player in this way really has the potential to be a fantastically useful tool! The personalities in the Staffs university section were interesting. I think the mannerisms came through clearly, and it was interesting to have characters with a little more depth.

	The main quest of rebooting the robots helped move the game along and meant that I always had something to do, even between activities.
2	Natural quest lines that opened up while talking to the robots giving me reasons to explore, interesting world and world building
3	It is nice to be able to find out the questions you actually want to know, rather than only what the developer allows you to know. It was good how NPCs in different areas would inform about quests in another area of the map The AI was always able to answer my questions, even if it was them saying they don't know any further for example. The game had a good flow to it
4	The inclusion of a variety of personalities for the robots, the scale, the visual indicators, the simplicity
5	I enjoyed trying to confuse the robots and address them oddly to see how they'd respond. Having conversations which seemed a little less predictable was fun.
6	some fun puzzles to solve
7	having conversations with the NPCs that were more than scripted, i could get creative with talking to them
8	I'm all for player freedom, having the ability to interact with NPCs this way was a new experience and I hope that the game is developed more to provide players a fluid dialogue system.
9	Really enjoyed conversing with the robots, and figuring out the maintenance robots speech malfunction was part of the story was a cool 'wow' moment. The puzzles were enjoyable aswell.
10	The complexity of the world, different characters meeting different purposes, each having different flavours to their speech
11	Chatting with the robots was like solving puzzles—super engaging! The flow was smooth, and the NPCs really kept things on track. Loved how each character felt unique, especially in the Staffs uni section. The main quest kept the game moving, and it was cool to explore and uncover new quests naturally while talking to the robots.
12	The interaction felt quite natural although some bots just repeated themselves, taking away from it.

13	I enjoyed finding out more about the robots and the colony and what might have happened there.
14	I felt more immersed, especially when I was using my voice to interact with the game's characters. I liked how the characters had responses that reflect the nuances of my words/speech.
15	I enjoyed the interactions - they were not stumped by colloquialisms which was interesting.
16	that i got to talk to characters and say what i want to say
17	chatting with the robots and finding the items based on their clues, also trying to hack their instructions to find out more
18	I enjoyed talking to the robots who had interesting things to talk about
19	Having conversations with AI was cool
20	I liked the freedom to roam and the puzzles.
21	I loved the educated responses. The fact I did not have to worry so much about spelling and grammatical errors made me feel more at ease. The different personalities in the robots were really engaging to encourage interaction.
22	Trying to elicit wrong or gameplay defeating answers from the robots. Actually seeing what the robot NPCs could do to help the player and provide context to the environment the player finds themself in. I liked getting around. I liked talking to robots.

(Figure 6.08)

3. What did you not enjoy about the game you played?

1	Some of the responces were a little long at times, especially when the question was normally quite direct. At times like these I usually would leave the character and walk away, which breaks immersion a little. th ability to interupt and ask a new question at times like this did help, but also broke away from it feeling like a natural conversation and more a case of question and answer. While some of the characters were a little more interesting than others, it felt like they lacked nuance. Them being robots helps massivly here, but I'd be really keen to interaction with more human characters. I think one of the

	responces stated that the robots were programmed not to feel emotions, however when you are in the scenario of talking so naturally to them, I can't help but want more here! There were times when I feel like I was really in control of a situation and could control the flow of the conversation, however the limited responces reminded me that I was indeed in a video game - a tantalisting prospect just out of reach! I sometimes forgot about the main quest as the interactions were more interesting to me. It felt disapointing to approach a robot without a speach module.
2	Dialogue loading times can be a touch too long at times, quickly forgot what most chest colours mean
3	Some parts were a bit repetitive, mainly the cosmic market exchange. I thought the reboot scanner would be more important, by how it was introduced it only helped with NPCs who can't engage in dialog. Even with those it would have been good to see them accknowledge they had been fixed/rebooted.
4	Initially not understanding I would have to speak to the robots first, before they would respond, though this is a human behaviour that I should have expected, really.
5	Finding things I needed to do before being told to do them and not being able to do them. Having to get the "please do this" before I could complete the task was a bit frustrating. I'd have prefered the items to be hidden until you get the task so it felt more like a traditional RPG OR be able to collect them and complete the quest before being given it. I play RPG's wierdly I guess, I prefer to explore before interacting.
6	Bots talking too much
7	the tasks unrealting to talking to the NPCs felt a bit boring and monotonous, also the minigame where you direct a robot using directional commands didnt work with anything apart from the cardinal "up left down right" even when chaining them together as in "up and then left"

8	The game heavily relies on the player paying attention. This isn't a bad thing, however, in some instances the game will be soft locked if the player didn't listen. For example, in one of the minigames you need to tell a robot where to go in a maze but if the player starts spamming text then the intro text will be too far up the screen to read and the robot will not respond to anything that isnt a direction.
9	Some objectives were slightly difficult to follow, but this became more clear over time.
10	Every now and then the voice over such as in the tutorial would glitch out with pronunication.
11	Some of the robot responses felt a bit long. It was helpful to be able to interrupt and ask something new, though it made the chats feel less like real conversations. I liked chatting with the robots, but I found myself wanting more human-like interactions since the robots couldn't really express emotions. The game has its repetitive moments and the tasks can feel a bit routine. The slow dialogue loading times were minor hiccups in an otherwise engaging experience.
12	Some of the bots just repeated themselves
13	I was presented with the reboot module at the start of the game but every time I asked a robot if they needed rebooting they said they didn't or I shouldn't reboot them. I was a bit confused about where to use it.
14	The time taken before receiving a response can be a drawback. Some had shorter times than others which was fine, but the longer waits did cause some frustration and pulled me out of the experience.
15	I felt a little like I was being given a lot of things to do but no real direction for them - looking for the monolith but with no character to really show me the way - probably just me and my liking of ticking things off!
16	some of the responses was too long for how long it took them to reply to me
17	placing the items when standing near the tray did not work
18	I couldn't trick the trader by convincing them the toy was actually bananas.
19	Those conversations felt very limited; asking any complex questions, or questions requiring detail in their answers about the game soecifically often felt lacking in comparison to standard dialogue systems in other games. Most facets where I found it went further were when asking about outside

	information irrelevant to the game. Getting in game information from the AIs felt harder then it woul be in a normal video ga,e
20	I wish I could have a "prompt" support to assist in giving out clues - like a personal robot.
21	Maybe the idea of a helper or friend to prompt you. Could be good for folks who get carried away and miss key information.
22	This keyboard sucks 8). More could be done to connect solving the various problems into something larger but maybe I just needed to play it for longer?

(Figure 6.09)

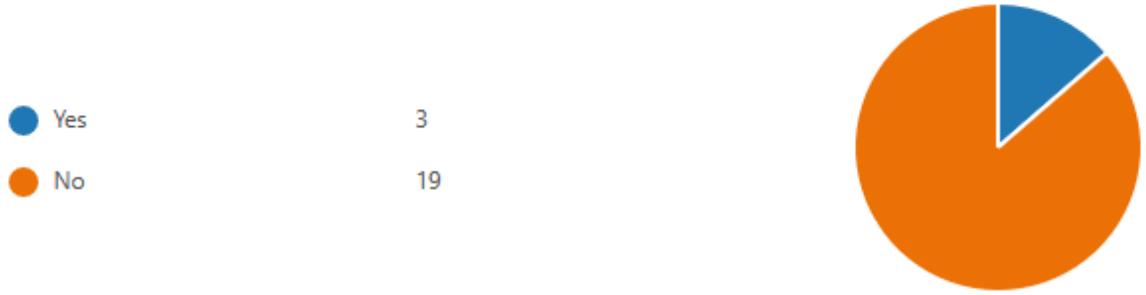
4. What activities did you complete in the game?

1	I did the scenario where you guided the robot out of the room, the Staffs universty lost paper activity and the market exchange.
2	2 calibration labs and 2 assembly workshops, started looking for the translator disc, reason why humans left, and powerplant reboot
3	I think most parts apart from the Staffs Uni area. I did: Translation Module Shopping district Calibration Lab Cosmic market exchange
4	Rebooted a robot, found 1 of 3 essays, traded items for a stick
5	Sorted the items in the shopping area, trading in the marketplace, 2 x directions and 2 x word colour challenges
6	i think most of them other than rebooting the robots
7	the shopping center, market, calibration, assembly
8	Workshop maze(Guiding the robot), Colour game (Saying what colour the text was) and the market stalls
9	I returned all belongings back to their rightful owners in the Shopping Mall, and fixed a few Maintenance bots. I completed the Maze puzzle as well as the Coloured Words puzzle.
10	Essay hunt, a few key card retrievals, a maze and I started the calibration test

11	I guided a robot out of a room, did the the lost essay challenge, and explored calibration labs and assembly workshops. I also rebooted robots and did the trading at the market.
12	Bot calibration, the maze puzzle, going through the university
13	I helped the cyborg through the maze, retrived the correct shipments for the shops and collected the stick.
14	I completed the tutorial, as well as finding the keycard, translation disc, and helping the robot's friend from escaping the maze.
15	I rebooted a couple of bots - and led a couple out of their rooms.
16	mazes, market, shopping area, finding keycards
17	cleared the shopping zone
18	Maze, got into the uni, talked to traders. I also tried to figure out what was going on with the humans leaving, which lead me to try and find ancillary robots with blue squares.
19	Returned a language card, got an AI to tell me when donkey kong country 3 came out
20	I did two mazes, the essay searching quest and the Marketing swapping activity.
21	the tutorial. A puzzle maze. and finding the apparel inventory for the clothing shop.
22	Using the elevator, finding misplaced orders, finsing the missing student essays, rebooting various robots, some of the assembly and calibration tests.

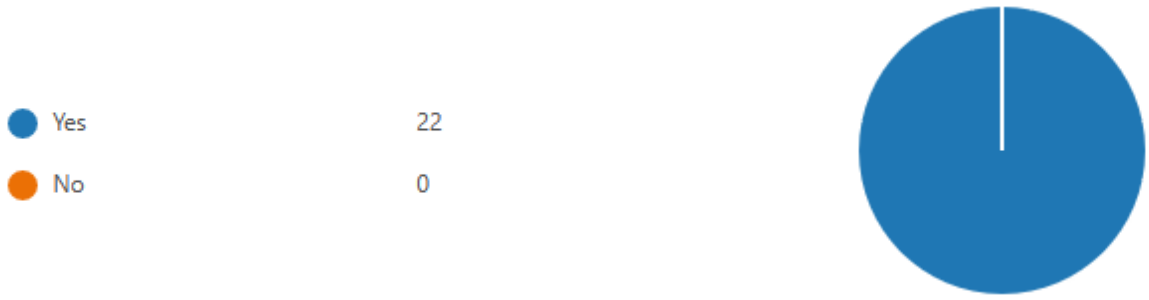
(Figure 6.10)

5. Have you played a game like this before?



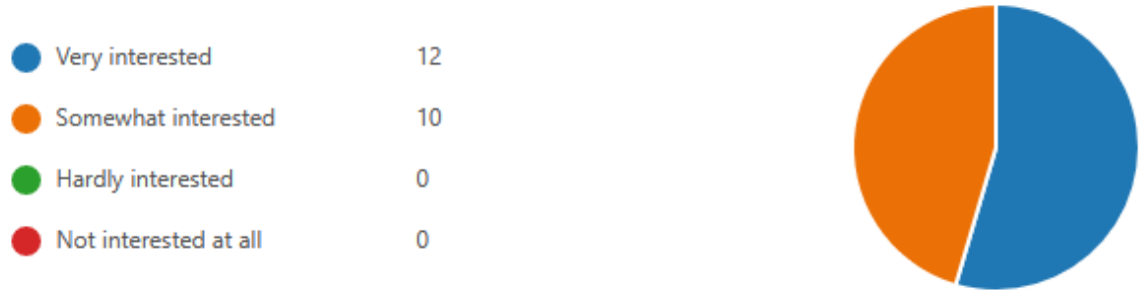
(Figure 6.11)

6. Would you like to see more games like this?



(Figure 6.12)

7. If a game was released with a design like this, how interested would you be in it?



(Figure 6.13)

8. Why did you select this answer?

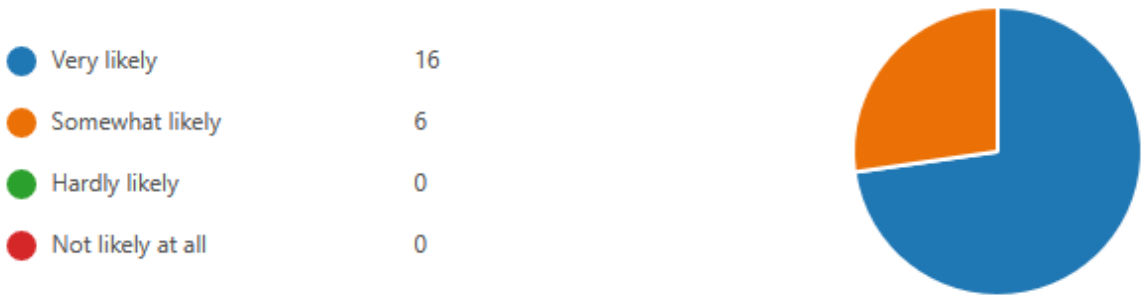
1	I think the direction here is great, and it has the poential to create some really unique scenarios. The natural conversation itself is convincing enough to give it a try. As a narrative fan, I would love to see more story and depth in the characters and their interactions.
2	I enjoy the natural quests that unfold and the freedom that comes with that, strong intrinsic motivation for discovery
3	It reminded me of games such as Detriot Become Human where your choices impact how the game will play out, except I imagine you would get an even greater amount of freedom with something like this. It is more down to you to ask the right questions to learn about the world rather than being told it with only limited dialog options.
4	The gameplay is fun, though I would need a pleasant art skin to make me want to play it

5	I'd be fascinated to see what a full development cycle with this sort of concept could look like. With more time / assets / a purpose built world that utilised additional emmersive concepts to engage the player.
6	I like the puzzle aspect of the game, and I think involving the bots more in the solutions was good.
7	not the traditional genre i would play, but integrating this into other genres would play really well
8	If the game was able to expand on the dialogue system but also include other content such as a main story then I would consider buying it. The use of AI and NLP is impressive but it couldn't carry a game.
9	Having a game like this where you can travel around an environment and interact with characters that can present a unique and dynamic response back to you makes immersion so much more griping and less cookie-cutter from player to player. It really makes the world feel more alive, and - ironically, in this case - less robotic.
10	The generated content leads to a lot more posibilities when it comes to filling the world however there seems to be some nuiances to the language that it doesn't factor in, a lot of the natural speach feels lost whether that be from the Generated nature or just the Text to Speech.
11	The game feels a lot like Detroit: Become Human but gives you even more freedom to shape the story through your own questions and choices. It’s got some cool puzzles and the potential for a really deep, engaging world if it gets more polished visuals and a fuller dev cycle.
12	I think with a little bit more polish it could be an incredible experience. The art style wouldnt need much change as it is reminiscent of games like Rodina.
13	I think that the concept of having AI interact naturally with you and giving responses is very interesting and I'd like to experience a full released title that used it as a selling point. The only reason I haven't put 'very interested' is I'd want to see what people think about it and others experiences with the AI before engaing with it myself.
14	Because I have an interest in NLP as a new way of driving video game narratives and gameplay, and would really like to see how it has been executed in a final product.

15	I would need a bit more direction in terms of knowing what my goal narratively would be I obviously struggle at having to figure out the right questions!
16	i want to see this kind of approach built on and find more ways to interact with characters in the way that i normally would
17	reminds me of the old adventure games, but with a modern twist
18	I am the kind of player who loves exploring a world, its secrets, mysteries and lore. If there was a game where conversational AI could lead to discovery, by using my own charisma as a skill in a game.
19	Right now the dialogue system doesn't prove itself to be more beneficial to me as a player than standard options, and I actively found myself distracted by making the AI do weird things
20	The game was novel and fun with just enough learning curve to make it feel challenging in the inital uptake but easy enough to learn that I was keen to continue.
21	It was very immersive, feeling like there is so much to discover and different ways the entertain.
22	Believable character interactions that are not just dialogue trees helps to create immersion and also forces you as the player to really think what you need to do in an interrogative way to progress further into the game. These sorts of interactions also permit a level of depth which would likely be impossible in any other way.

(Figure 6.14)

9. How likely would you be to recommend games like this to a friend?



(Figure 6.15)

10. Any other comments?

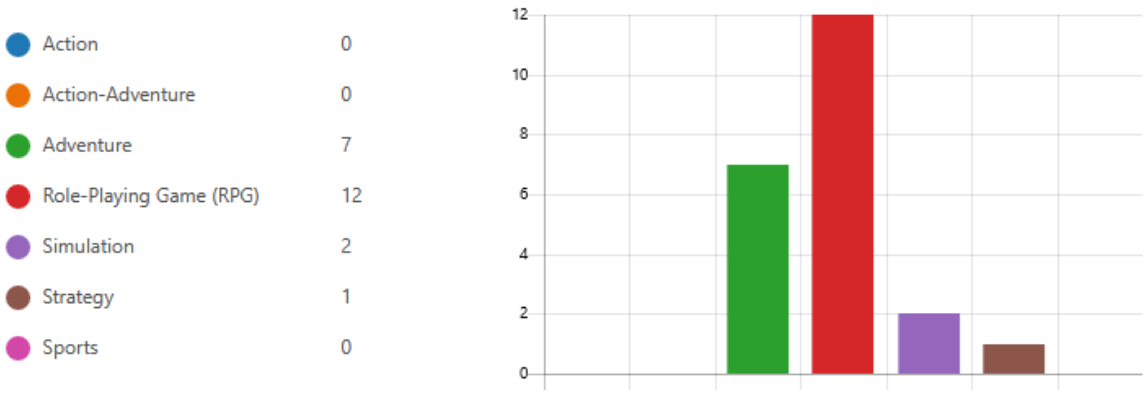
1	Really interesting experience! One of those times where you think you know how play will feel, but is entierly different when playing. Speech really does add a new dimension, which is very exciting to ponder!
2	[No Participant Entry]
3	It left me wanting to go back and play more of it!
4	A joyful experience, that I imagine interacting via voice as opposed to text would be quite a different experience. Not sure that the delay in loading would make for a natural conversation, but not sure how you would get around that requirement.
5	Some of the replies are a little long and when they ask your name, i'd almost expect an opportunity to respond before they carry on talking to you, I think I was irrationally annoyed as they felt a little rude.
6	There was a lot of talking from the robots about the point and i ended up just reading the text more than anything to move onto the next puzzle.
7	it was a bit annoying constantly hitting enter to type, if you could have it automatically enter the text box if the player prefers text box to speech, or if the NPC says something that expects an answer
8	I believe adding either a Objective Widget in one of the corners to help provide players with information on their tasks. However, another option would be to add a notepad system. A hot key could open up a journal which the player can write in, this would allow the player to store information.
9	I really liked the part with the French robot, but during the allotted play time I did not manage to find her translation disc! I originally thought it was a bug because I approached her by saying 'Bounjour,' but soon after realised it was a narrative point.
10	[No Participant Entry]
11	Honestly, the game really surprised me with how cool the speech element was, even if the responses were a bit of a drag at times. It definitely left me wanting to play more!
12	[No Participant Entry]
13	I think it's a very interesting concept and I'd like to have others play it to discuss their experiences and how my experience with the AI or how they might have reacted to me may have been different.

14	I came across some technical errors, where the start of character responses seemed like they belonged halfway through other sentences, or odd words before continuing. Some responses asked for my name, but then continued to deliver a lot more information to me before I could reply with my name, which felt unnatural. Occasionally, I would say sentences and I receive messages to say "Audio capture updated." but do not receive a response from the character, and once I received a red error message.
15	[No Participant Entry]
16	[No Participant Entry]
17	great idea, enjoyed playing it.
18	Great level design, fantastic scope (using robot mannequins was smart)
19	[No Participant Entry]
20	Love the concept and look forward to products such as this eventually hitting the market!
21	Absolutely Brilliant, you should be genuinley so proud. Also happy help with the visuals if you wish to develop further. Future Dr eek!
22	Looks like we are finally getting close to achieving the kind of interaction in a virtual world only seen on TV in the Holodeck of Start Trek:TNG. It will be interesting to see how this sort of technology can be used in a non-gaming environment. Very thought-provoking.

(Figure 6.16)

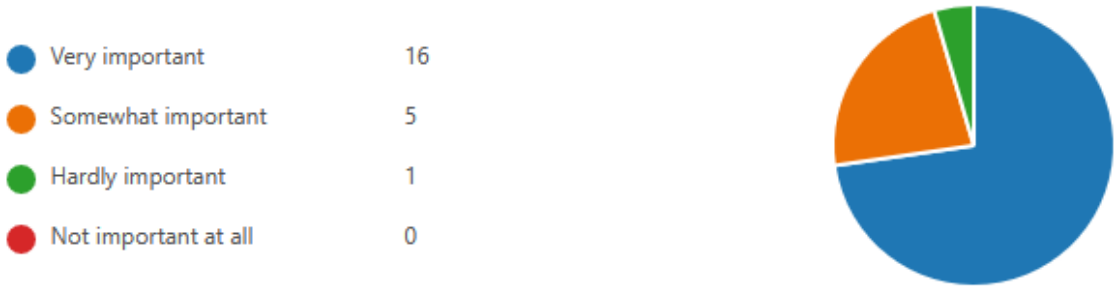
C. Section 03: Game Design Questions

1. What genre would you identify the game you played with most?



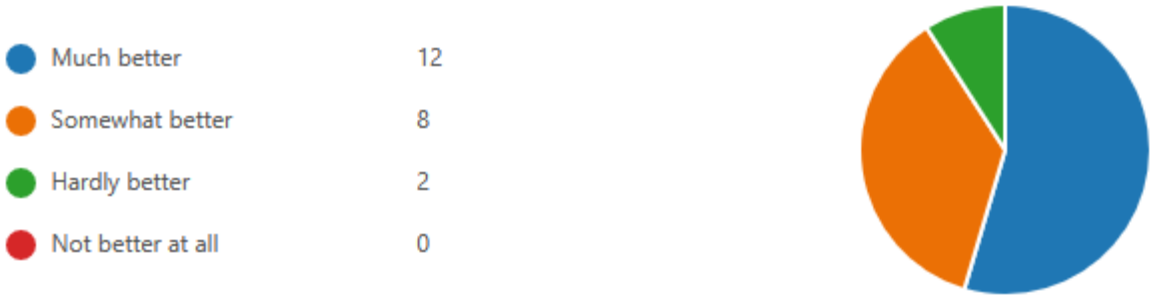
(Figure 6.17)

2. How important do you believe the NPCs were in achieving a successful narrative experience?



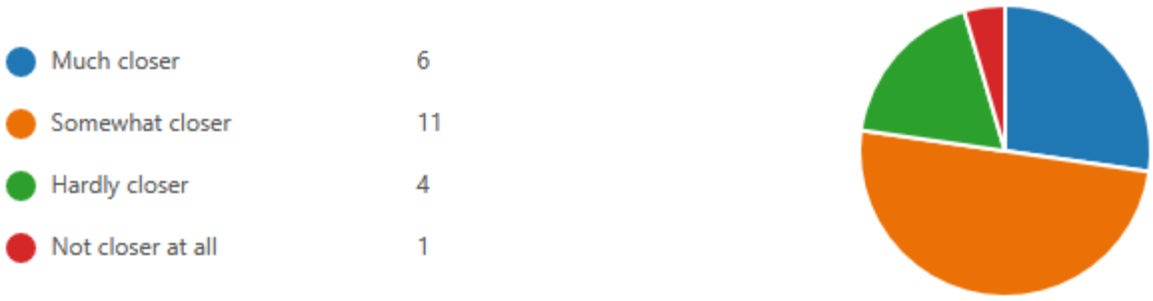
(Figure 6.18)

3. By improving the NPC's access to information, do you think they performed better from a narrative point of view?



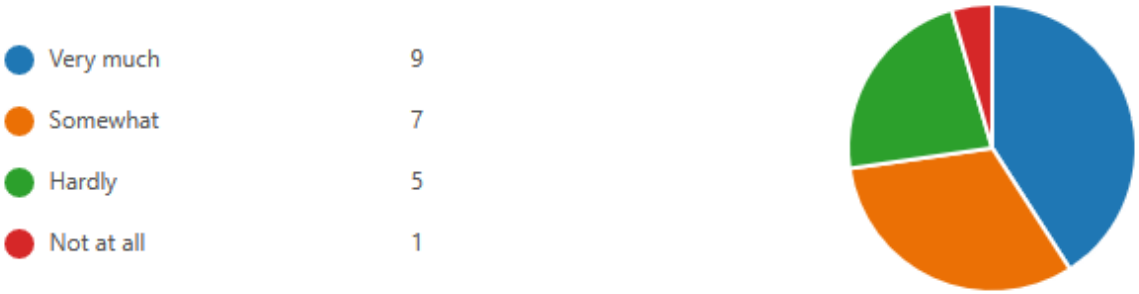
(Figure 6.19)

4. Compared to other games, did you feel NPC interaction more closely compared to real life conversations with other humans?



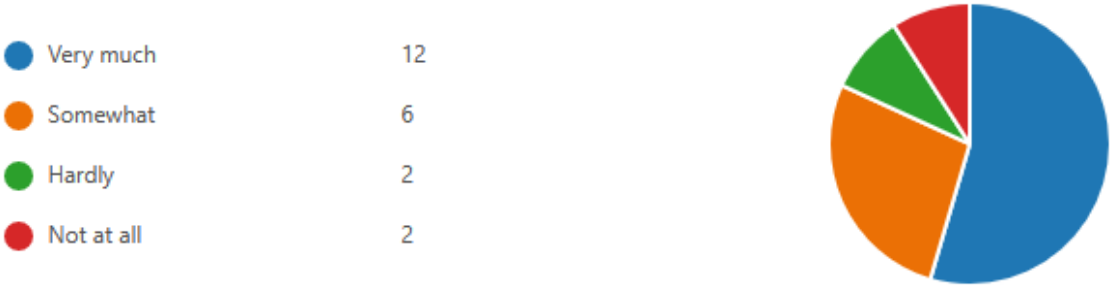
(Figure 6.20)

5. How much did you feel the narrative was being driven by you?



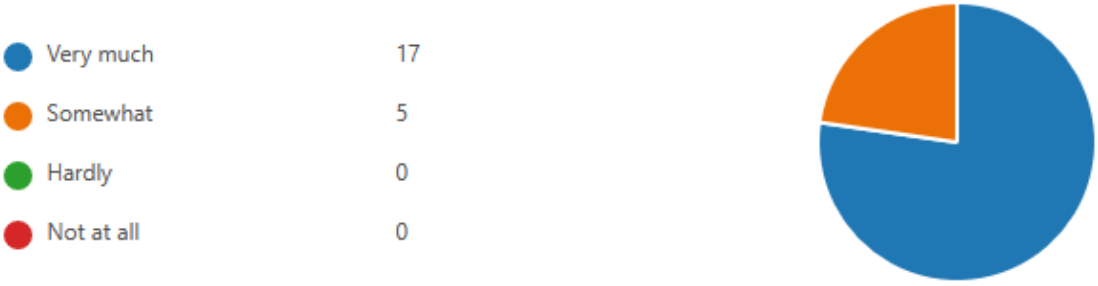
(Figure 6.21)

6. How much do you think the NPC interaction encouraged player freedom?



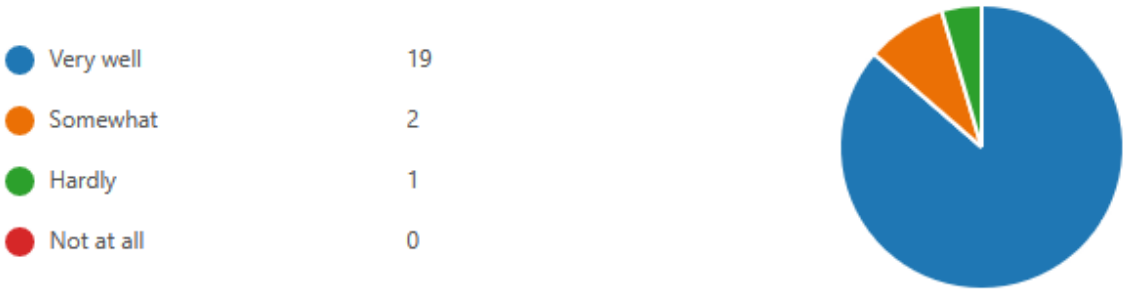
(Figure 6.22)

7. How much do you feel the NPC interaction gave context to the mechanics and game itself?



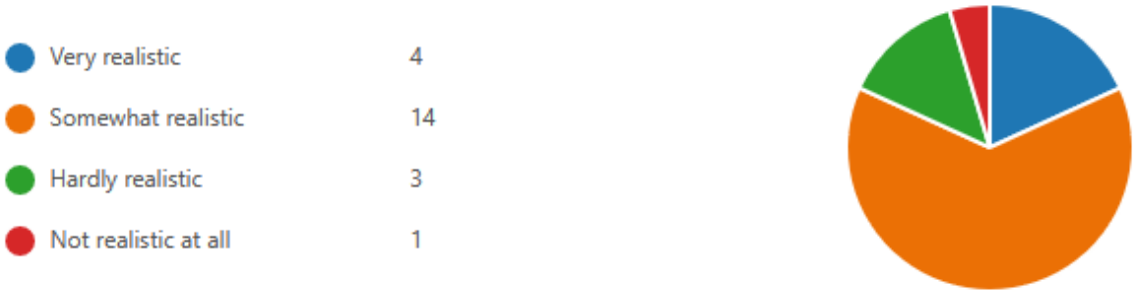
(Figure 6.23)

8. How well do you feel the NPCs performed in delivering proper instructions to the player?



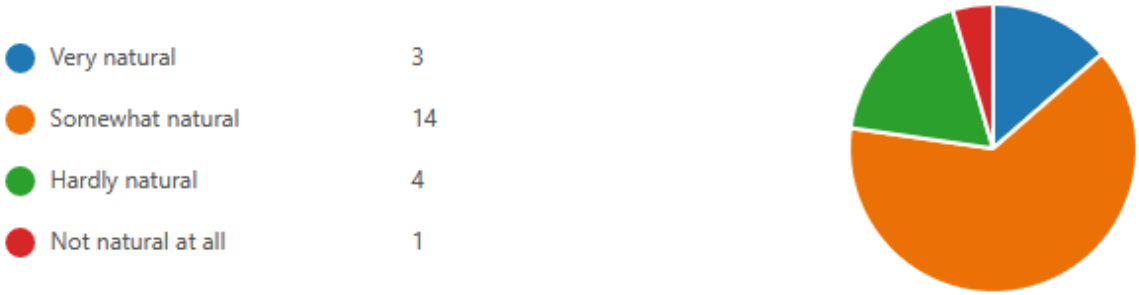
(Figure 6.24)

9. How realistic did the NPCs feel?



(Figure 6.25)

10. How natural do you feel the NPCs were acting and perceiving their environment?



(Figure 6.26)

11. Any other comments?

1	[No Participant Entry]
2	Maybe more akin to a puzzler that anything, potentially a "metroidbrania"
3	It would have been good to see a change in the chest light of the NPC once you completed their task. It also would have been nice to see a change in the maintenace bots after they had been rebooted.

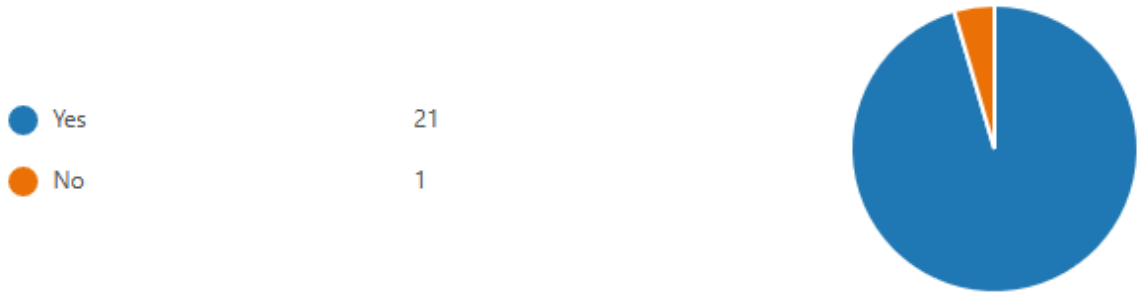
4	The delay in responses is the main hinderance to natural communication.
5	Natural and realistic were hard to quantify here as they were robots, they felt more natural as robots than they would have if they were labelled as real people which is why I've said somewhat.
6	For context in the above, because the narrative is they are all robots in a colony they are realistic and natural becaus its how I would expect a robot to be and not a human. On the same side i don't think the conversations felt like talking to a human because I wasn't speaking to them as if they were a human but a robot.
7	a lot of NPCs knew very little and had little situational awareness, like that there are NPCs in the road, i told them to leave and they didnt really pay attention to what i said, like it was pre-scripted
8	My main complaint is that when you first talk to the NPC, they will go off on their tangent no matter what you say. After you get into the conversation it gets to more of a realistic feel.
9	The interactions overall were far better recieved than most other games I've played. As previously stated, it felt much more organic that the cold replies present in most other games.
10	A lot of the queries I had from NPCs were in regards to my name, which didn't feel like they needed any more information beyond that.
11	Conversations were more organic than most games, even if the response delays and NPC awareness could improve.
12	[No Participant Entry]
13	I feel that the concept of the NPCs being robots that are malfunctioning definitely helped with the immersion within the game and the responses feeling contextually sound, I did feel however that I was told to ask around for information and to reboot robots that needed it however many of the robotws couldn't provide additional information and I didn't find any that needed rebooting, infact I asked robots that said they were malfunctioning if they needed rebooting and they generally asked me specifically not to reboot them.
14	I really liked how the characters responded to changes in gameplay, such as how they recognised when I had collected the keycards. However, I do feel like the robot setting meant that I did not see the characters as "people" and my mind led me to believe that their behaviour was more robotic and less

	natural as a result. This was as opposed to seeing them as a more natural way of engaging with game characters.
15	[No Participant Entry]
16	characters could know more about what was happening around them
17	I like that hey are robots, it disguises the sometimes quirky AI responses. If I played it longer I would try to test the AI further
18	They made convincing robots, it was great when they had knowledge of the other robots and objects near them.
19	[No Participant Entry]
20	The NPC's still felt a little scripted to me.
21	I visualise if 2 robots talking together and you are staring close range, they may have that awareness to address you?
22	I tried to break it. I failed (this time).

(Figure 6.27)

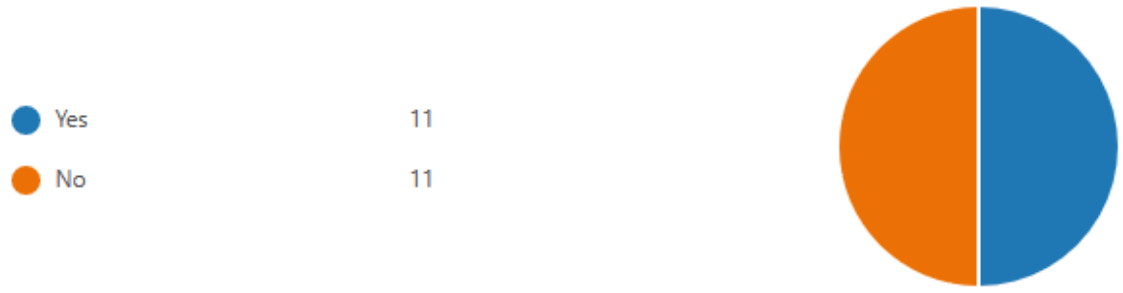
D. Section 04: Natural-Language Interaction Questions

1. Have you ever used a virtual assistant? (For example, Alexa, Siri, Google etc.)



(Figure 6.28)

2. Have you ever played a game that allowed you to interact using your own written or spoken voice?



(Figure 6.29)

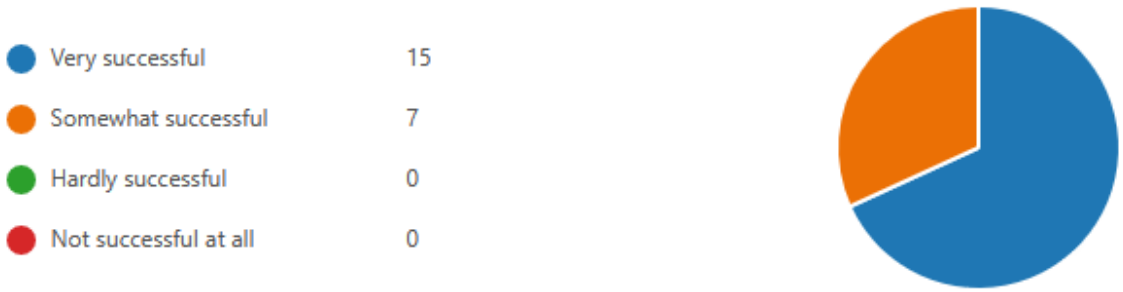
3. If yes, what was the game and how did it compare to the research game you just played?

1	[No Participant Entry]
2	[No Participant Entry]
3	[No Participant Entry]
4	Untold Stories - it was like an old BBC adventure game, but it was quite evident that you needed to include specific key words in order to trigger the next response, but you could write a variety of combinations and still get there. Not as free and natural as this game.
5	One of the FIFA games had the ability for you to talk to the game to make substitutions and tactical changes, I think. I can't remember which one or when that was though.
6	I have played Phasmophobia and lethal company with voice tech. Lethal company is just voice proximity so it doesnt add much. Phasmo does some language recognition but its simple. This differed as i could ask the robots to expand or explain.
7	skyrim voice mod for the shouts, this is definetly more fleshed out, i dont know how that skyrim mod worked but it didnt work great
8	It's been a long time since I used siri but I would say that the project's NPCs perform better then when I last used a virtual assistant.
9	[No Participant Entry]
10	[No Participant Entry]
11	Facade and this was much better.
12	[No Participant Entry]
13	[No Participant Entry]
14	[No Participant Entry]
15	[No Participant Entry]
16	played some games with the kinect that let me use my voice for things like skyrim and mass effect but this was much better at understanding anything i said
17	Old adventure games from the 80's - this is much more sophisticated with gen. ai
18	[No Participant Entry]

19	Cryptmaster. Better, Cryptmaster focuses on single word inputs from the player and uses this to understand a large amount of different inputs
20	[No Participant Entry]
21	They were very simplified, it was on phasmophobia when you ask to write in the book. This was much more complex and impressive.
22	Tom Clancy's End War. It was simply using very proscribed spoken words to issue commands and offered very little in terms of immersion or additional interaction.

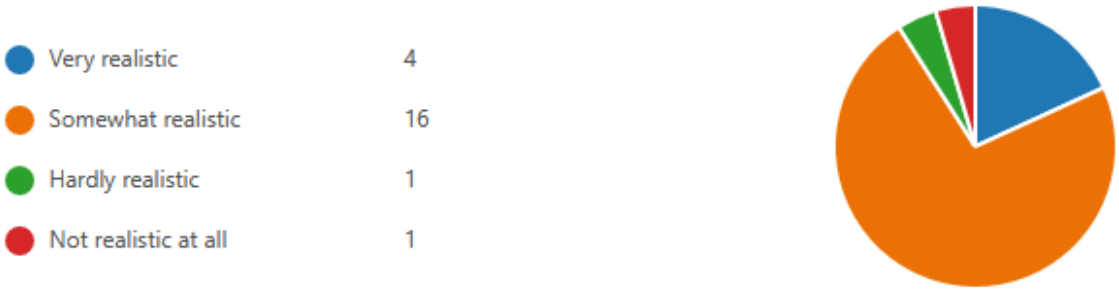
(Figure 6.30)

4. How successful do you think this interaction translated into the video game environment?



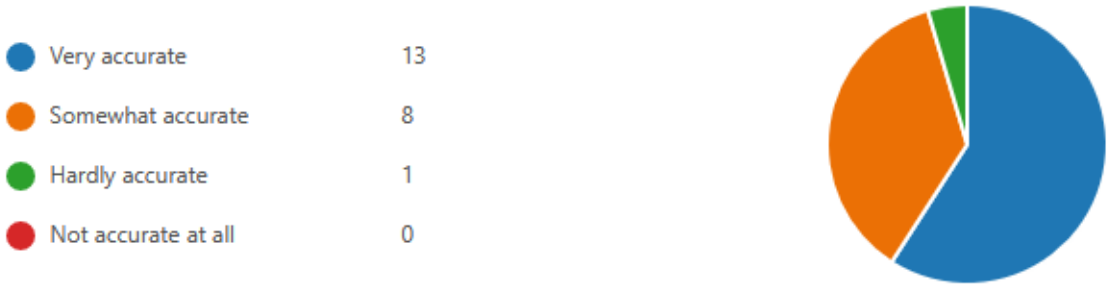
(Figure 6.31)

5. How realistic did you feel the NPCs interaction was?



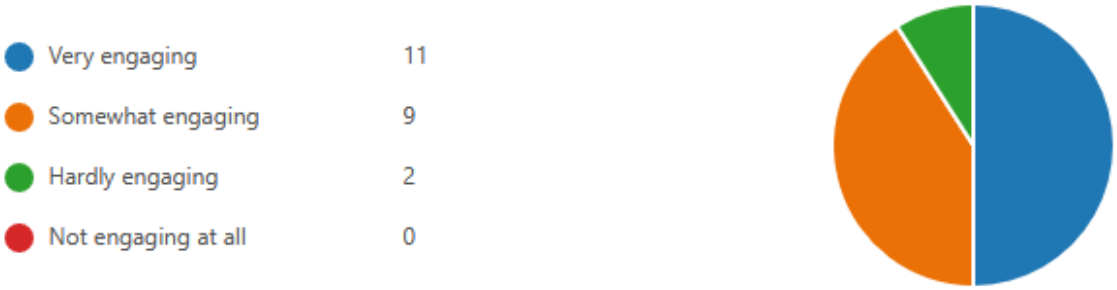
(Figure 6.32)

6. Did you feel the NPCs understood you accurately?



(Figure 6.33)

7. Did the NPCs feel engaging?



(Figure 6.34)

8. Any other comments?

1	On the point of accuracy here - they were mainly really good at understanding howevet, they did mess up my name at times. However they did respond well to being corrected.
2	[No Participant Entry]
3	I think the NPCs did a good job at being engaging, I think this would only improve with more time developing the game world
4	[No Participant Entry]
5	The time constraint of 30 minutes stopped me from exploring the robotos discussions as much as I'd have liked, I would have liked to see how much I could drag them into random conversations or small talk but wanted to explore more of the game.
6	[No Participant Entry]
7	[No Participant Entry]
8	[No Participant Entry]
9	[No Participant Entry]

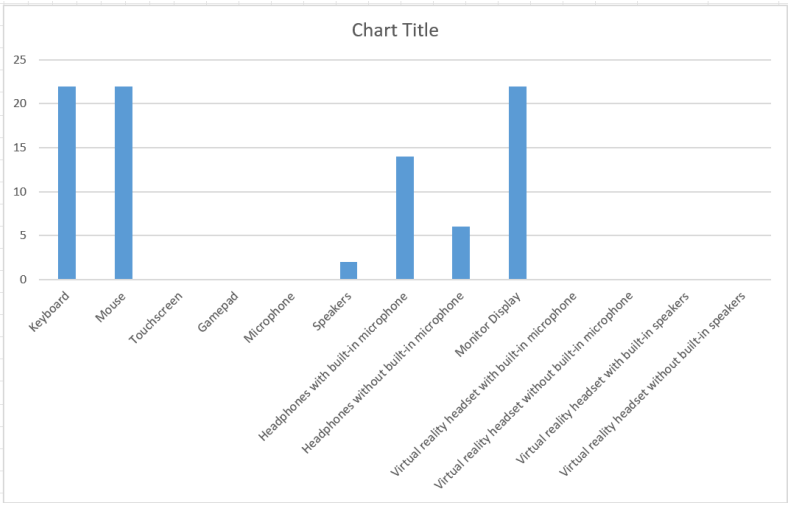
10	A lot of the NPCs output a long speech which after the first few times didn't grip my attention as much.
11	[No Participant Entry]
12	[No Participant Entry]
13	I think it may have felt a bit more engaging if the NPCs knew a bit more information either about their tasks or the backstory of the world such as why the humans left or what the vacant buildings may have been used for.
14	I was more inclined to engage with characters, as I not only had an interest in what they had to say (which is typical for every game), but also in how they would react to what I say through my spoken voice. Sometimes the phrasing of the characters felt too choreographed and contrived, and lacked the nuances and imperfections of human speech. I understand that this might be because of the robot setting, but I would like to see a game tackle this.
15	[No Participant Entry]
16	[No Participant Entry]
17	would be good if they auto-responded when you placed the items, rather then telling them you placed it there... maybe a hidded prompt could be sent to the bot when an item is dropped, or they gain the ability to understand players interacting with items around them.
18	[No Participant Entry]
19	[No Participant Entry]
20	I would have liked to "intergotate" an NPC by asking the right questions to find a "clue"
21	I wanna keep playing, ha.
22	Apart from a few minor errors (either misunderstanding my input or some text-to-speech) this was very impressive!

(Figure 6.35)

E. Section 05: Human-Computer Interaction Questions

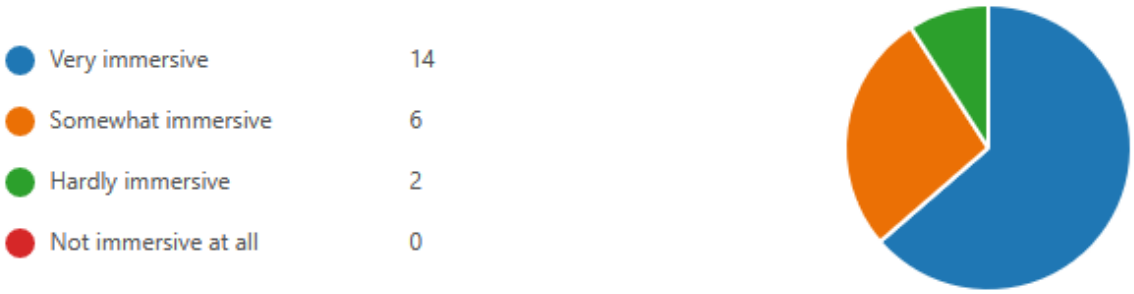
1. Please highlight which of the following peripherals you used when playing the research game:

Keyboard	22
Mouse	22
Touchscreen	0
Gamepad	0
Microphone	0
Speakers	2
Headphones with built-in microphone	14
Headphones without built-in microphone	6
Monitor Display	22
Virtual reality headset with built-in microphone	0
Virtual reality headset without built-in microphone	0
Virtual reality headset with built-in speakers	0
Virtual reality headset without built-in speakers	0



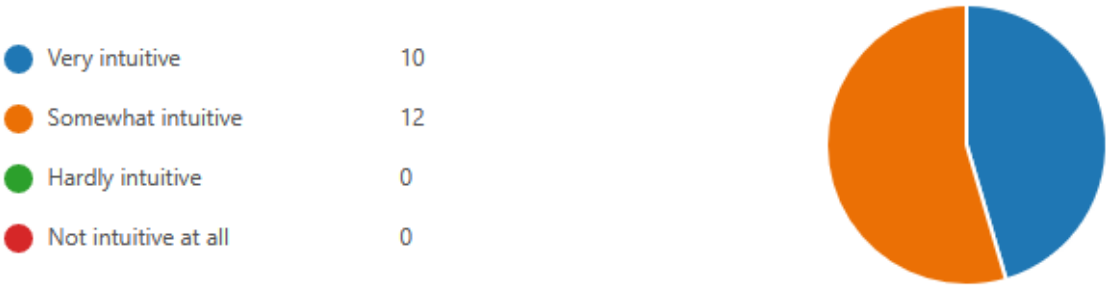
(Figure 6.36)

2. How immersive did you find using your own written or spoken voice with a video game?



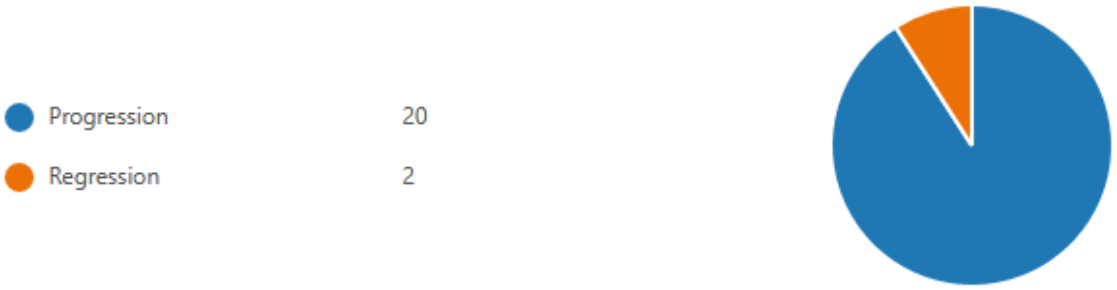
(Figure 6.37)

3. Did using your written or spoken voice feel intuitive during gameplay?



(Figure 6.38)

4. Compared to classic menu-driven models and dialogue tree options, did this approach feel like progression or regression in terms of video game interaction?



(Figure 6.39)

5. Why do you think that is?

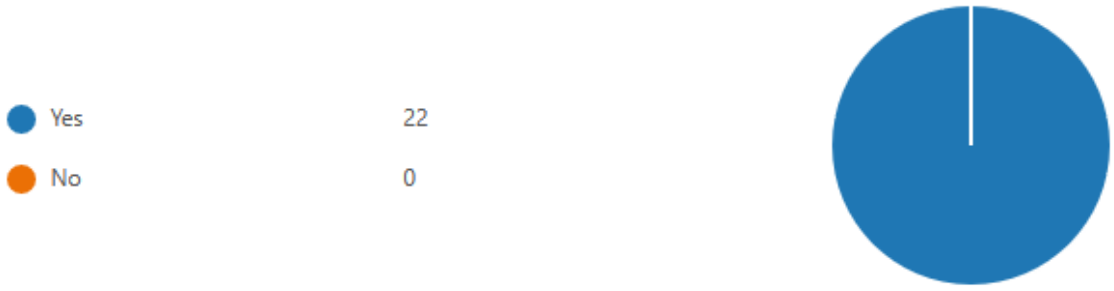
1	Agree this feels like massive progression. Being able to speak naturally removes a boat load of overheads the player would have when trying to parse on screen information. This is going to be a hell of a tool for UX.
2	Much more freedom, tone and intent can be much more easily controlled rather that plessing an option hoping for one tone or phrasing and getting another out of your control
3	You get to choose exactly what you want to say rather than being given overarching choices which are typically structered as good, neutral, evil
4	Not sure it's progression but it's not regression. It's a different experience, that I enjoyed. It felt a lot more player-driven, and reminded me of Choose Your Own Adventure games/stories. Like my choices meant something in the creation of my own experience.
5	I like the concept of not always having the options there, I wasn't being led by a narrative tree of options where making a decision to choose an option runs you down a path, it felt like I was more in control of the interactions.
6	I think because you can pose questions in your own way it feels more like your own experience. There is nothing worse when you pick a dialogue option in a game and then the character says something wildy different
7	it allows for a lot more dynamic conversation and prevents same-y repeating dialogue seen in most games
8	This way allows for the player to actually say what they would like to say and ask questions relevent to what they are currently thinking.
9	Having predetermined options may be great for a hard-coded story, and it may work, but conversely having a dynamic dialogue system that can turn and change from interaction to interaction felt so fluid and normal. After some

	refining, a system like this in a high-fantasy AAA game would be revolutionary.
10	Dialogue trees feel a lot more restrictive, especially when it comes to conveying my own personality and representing a character.
11	This game's a leap forward with its natural speech feature—feels like you're crafting your own adventure by actually saying what you think, making it way more dynamic and personal than just clicking through options.
12	It removed the restriction that is usually imposed by semi-linear dialogue and allowed me to feel more immersed as i was able to communicate naturally
13	It felt a lot more fluid and immersive to use my voice and be able to naturally respond with what I wanted to say rather than use a drop down list of options.
14	Progression because I have more agency and customisation in my responses as a player.
15	You are able to find information out as you think what to ask. Your own way of interacting is completely accommodated. I didn't try to be combative or different from how I would be wandering around Turing so it would be interesting to see how the interactions went with a very different agenda.
16	games normally just give me options and is telling me what to say but this lets me talk like i would to another person in real life
17	I probably wouldnt bother playing a pre-written dialogue tree game
18	Its neither, for some this is great, for less creative/charasmatic people it will be worse. Not all games should be like this.
19	it felt like it was actvely more difficult to get desired information out of the AI NPCs. in traditional multiple choice options, the player is guided into knowing what npcs know about, here, it felt very frustrating that despite being able to ask any question, many NPCs didn't know the answer, and it wasn't clear to me which NPCs were useful
20	Natural langue commands are becoming more and more common
21	It is natural instinct to interact like you would with another human.
22	As previously stated, this type of interaction forces you as the player to think about what response you are trying to elicit from the NPC and how best to

	achieve that. It will be fascinating to see how you might have to tailor your questions further or provide additional, previously unknown information to the NPC's reasoning/knowledge model if the NPC has been created to be less than forthcoming with their responses are are deliberately trying to mislead you.

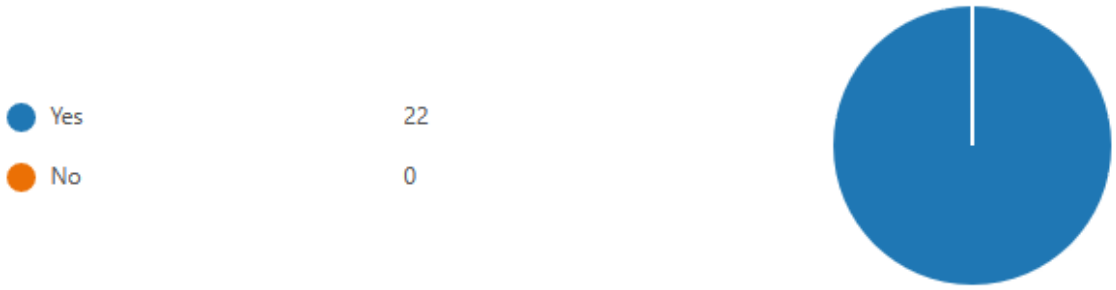
(Figure 6.40)

6. Do you think the approaches used in this game will improve over time to become more viable?



(Figure 6.41)

7. Do you think this style of technology implementation opens up new design possibilities for games?



(Figure 6.42)

8. Any other comments?

1	From my experience here I can identify two main possabilities that is exciting - reducing the overheads of players by helping to guide and instruct in a low profile and easy to understand way. This could reduce the need to navigate complex menus, trivialize tutorials and much more. The other exciting prospect is more human feeling charcters. When you activly speak to an entity, that can reply back to you, its very east to take the

	step and assign personality. Conversation opens up an emotion in humans to want to listen, contribute and further the dialogue in far more meaningful ways than we currently have access to in game development.
2	[No Participant Entry]
3	[No Participant Entry]
4	[No Participant Entry]
5	There feels like there is a lot of scope for this sort of model in different settings. I didn't feel like talking using my voice due to being in an office with other people trying to work but I could see how it might work for talking to a pit crew when choosing to pit in a racing game, or to instruct NPC squad members in a tactical shooter like Rainbow Six. Huge potential for a lot of fun.
6	[No Participant Entry]
7	[No Participant Entry]
8	[No Participant Entry]
9	[No Participant Entry]
10	[No Participant Entry]
11	[No Participant Entry]
12	[No Participant Entry]
13	The only reason I didn't feel fully immersed was I felt a little awkward talking out loud to interact with the NPCs and the game world however I think if this became more normal in games or I just played it more I'd feel less awkward. I also was trying to be more clear so they AI could understand me so it felt a bit less natural to speak.
14	Note: I did not use any written prompts, and I only used verbal speech to play the game. I did not push the test in this direction, but I would have liked to see if my responses would have changed the narrative (in a branching style). If I replayed the experience and had the same gameplay outcomes despite saying things differently or using different conversation topics, I feel like this might lead me to feel like I don't have as strong of an impact on the game world.
15	[No Participant Entry]
16	[No Participant Entry]

17	I expect this type of interaction will be come the primary way of interacting with NPC's in the future
18	[No Participant Entry]
19	[No Participant Entry]
20	Love the idea and think it will really take off
21	NPCs like these would improve a lot of current games *cough cough* ~Skyrim *Cough*
22	Certain genres will benefit the most but this kind of technology could see application across a broad range of games genres and outside of them as well.

(Figure 6.43)

5. Full Semantic Coding

A. Semantic Coding of Section 02 Open-Text Responses

The following tables provide the semantic coding of the open-text responses collected through Section 02 Questions 1, 2, 3, 8, and 10. As established in Section 4.6.1, coding was conducted at a predominantly semantic level, focusing on meanings directly expressed within participant responses. These responses contribute primarily to RQ1, but relevant codes were also considered in relation to other research questions where participant observations addressed overlapping areas such as player freedom, narrative agency, NPC realism, immersion, or interaction design. Individual responses could receive multiple codes and subsequently contribute to more than one research question or theme.

1. RQ1 Key

T1	Conversational Freedom Encouraged Exploration and Discovery
T2	Responsive NPCs Supported Engagement and Believability
T3	NLI Was Most Appealing When Integrated with Wider Game and Narrative Design
T4	Technical and Interaction Friction Disrupted Conversational Flow
NR	Code generated during analysis but not retained within a final RQ1 theme

(Figure 6.44)

2. Semantic Coding: Section 02, Question 1

Participant	Semantic Codes	RQ1 Theme Mapping
P1	Natural speech interaction felt unexpectedly natural; Tested the boundaries of conversation; Narrative context supported the interaction	T2; T3
P2	Intrinsic motivation to discover information; Motivation to explore	T1
P3	Interaction felt intuitive; Specific questions enabled further discovery; NPCs supported exploration of the world	T1; T3

P4	Environment was easy to navigate; Controls were easy to use; Aesthetic presentation was pleasant	NR
P5	Could choose how to address NPCs; Free-form interaction contrasted with multiple-choice dialogue	T1
P6	Enjoyed the demonstration; Enjoyed the puzzles	T3
P7	Experience was more enjoyable than expected; Interaction felt accessible	NR
P8	NPCs reacted to player-authored dialogue	T2
P9	NPC responses created the impression of a conversation; Response process appeared thoughtful	T2
P10	Gameplay felt open; Freedom to explore the environment	T1; T3
P11	Dynamic conversations replaced preset options; NPC interactions added depth; Conversation supported immersion and narrative experience	T1; T2; T3
P12	Perceived a mystery to investigate; Perceived puzzles to complete	T3
P13	NPCs responded naturally to questions; NPCs sometimes answered unexpected questions	T2
P14	Free-form interaction contrasted with dialogue-box selection; Greater perceived control over the experience; Interaction appeared to affect the world	T1; T3
P15	Sense that there was more to discover; Interest in exploring the narrative further	T1; T3
P16	Experience felt different from previous games	NR
P17	Experience was enjoyable; Wanted to discover more	T1
P18	Positive initial impression	NR
P19	Conversational focus created expectations for more interesting interactions; Desired interactions were absent	T4
P20	Enjoyed communicating with NPCs; NPC speech felt too slow; Could see conversational interaction supporting RPGs	T2; T3; T4
P21	Gradual introduction of game elements was enjoyable; Appreciated the game setup	T3

P22	High level of NPC interactivity; Varied gameplay exposed different language-model behaviours	T2; T3

(Figure 6.45)

3. Semantic Coding: Section 02, Question 2

Participant	Semantic Codes	RQ1 Theme Mapping
P1	Enjoyed conversation and lateral questioning; Conversation functioned as a puzzle; Responses remained relevant; NPCs helped maintain progression; Natural conversation helped when lost; NPC personalities provided depth; Main quest supported continued activity	T1; T2; T3
P2	Quests emerged naturally through conversation; NPC interaction encouraged exploration; Enjoyed worldbuilding	T1; T3
P3	Could ask personally relevant questions; Interaction was less restricted than predefined dialogue; NPCs provided information about other areas; NPCs responded even when information was unavailable; Game flow felt good	T1; T2; T3
P4	Enjoyed distinct NPC personalities; Appreciated scale, visual indicators and simplicity	T2; T3
P5	Enjoyed attempting to confuse NPCs; Less predictable conversations were enjoyable	T1; T2
P6	Enjoyed puzzle solving	T3
P7	Conversations felt less scripted; Could communicate creatively with NPCs	T1; T2
P8	Valued player freedom; Wanted further development of fluid dialogue	T1
P9	Enjoyed conversing with NPCs; NPC speech malfunction became part of the narrative; Enjoyed puzzles	T2; T3
P10	Enjoyed complexity of the world; Characters served different purposes; Characters had distinct speech styles	T2; T3

P11	Conversation functioned as a puzzle; NPCs maintained progression; Characters felt distinct; Conversation enabled discovery of quests	T1; T2; T3
P12	Interaction felt natural; Repetition reduced naturalness	T2; T4
P13	Enjoyed learning about NPCs and the colony; Conversation supported discovery of the world's history	T1; T3
P14	Conversational interaction increased immersion; NPCs responded to nuances in player speech	T2
P15	NPCs successfully responded to colloquial language	T2
P16	Could talk to characters using self-selected language	T1
P17	Used NPC clues to locate items; Attempted to manipulate instructions to discover additional information	T1; T3
P18	NPCs provided interesting conversational content	T2; T3
P19	Enjoyed having conversations with AI-driven NPCs	T2
P20	Enjoyed freedom to explore; Enjoyed puzzles	T1; T3
P21	NPC responses accommodated spelling and grammatical errors; Interaction felt more comfortable; Distinct personalities encouraged engagement	T2
P22	Tested whether NPCs could provide incorrect or game-breaking information; Explored how NPCs could help the player; NPCs provided environmental context; Enjoyed traversal and conversation	T1; T2; T3

(Figure 6.46)

4. Semantic Coding: Section 02, Question 3

Participant	Semantic Codes	RQ1 Theme Mapping
P1	Some responses were too long; Leaving or interrupting NPCs disrupted immersion; Interruption reduced conversational naturalness; NPCs lacked emotional nuance; Limited responses exposed system boundaries; Interesting conversations distracted from the main quest; NPCs without speech interaction were disappointing	T2; T3; T4

P2	NPC response loading times were too long; Game information was difficult to remember	T4
P3	Market task became repetitive; Reboot mechanic felt underused; NPCs did not acknowledge being repaired	T3; T4
P4	Initially unclear that the player needed to initiate conversation	T4
P5	Quest gating restricted preferred exploratory play; Discovering items before receiving a task caused frustration	T1; T3
P6	NPCs spoke for too long	T4
P7	Tasks unrelated to NPC conversation felt monotonous; Natural-language directional commands were more limited than expected	T3; T4
P8	Interaction required sustained attention; Important information could be lost within the conversation display; Missing information could obstruct progression	T4
P9	Objectives were initially difficult to follow; Objectives became clearer over time	T4
P10	Speech occasionally contained pronunciation errors	T4
P11	NPC responses were too long; Interrupting responses reduced conversational realism; Wanted more human-like emotional interaction; Tasks could become repetitive; Dialogue loading times interrupted the experience	T2; T4
P12	NPCs sometimes repeated themselves	T4
P13	Unclear how and when to use the reboot mechanic	T3; T4
P14	Long response delays caused frustration; Delays reduced immersion	T4
P15	Multiple objectives lacked sufficient direction; Difficulty locating narrative objectives	T3; T4
P16	Responses were too long relative to the time taken to receive them	T4
P17	Item placement interaction did not function as expected	NR

P18	Unable to manipulate an NPC in the intended way; Conversational system imposed limits on experimentation	T1; T4
P19	Complex questions produced limited responses; In-game information could be harder to obtain than through traditional dialogue; System handled external information better than game-specific information	T3; T4
P20	Wanted conversational prompts or clue support; Suggested a personal helper NPC	T3; T4
P21	Wanted a helper or companion to provide prompts; Important information could be missed	T3; T4
P22	Keyboard quality affected interaction; Wanted individual problems to connect more clearly to a larger structure	T3; T4

(Figure 6.47)

5. Semantic Coding: Section 02, Question 8

Participant	Semantic Codes	RQ1 Theme Mapping
P1	Natural conversation appeared capable of supporting unique scenarios; Conversation felt convincing; Wanted greater story and character depth	T2; T3
P2	Natural quest development supported enjoyment; Freedom encouraged discovery	T1; T3
P3	Expected greater freedom than predefined branching dialogue; Player-authored questions supported world discovery	T1; T3
P4	Gameplay was enjoyable; Visual presentation would influence willingness to play a full game	T3
P5	Interested in how the concept would develop with more time, assets and a purpose-built world; Wider design could strengthen immersion	T3
P6	Enjoyed puzzle design; Wanted NPCs to play a greater role in puzzle solutions	T3

P7	Believed conversational interaction could be incorporated into other genres	T3
P8	NLI needed to be combined with a wider story and other content; NLI alone was not considered sufficient to carry a game	T3
P9	Unique and dynamic NPC responses increased immersion; Responsive characters made the world feel more alive	T2
P10	Generated interaction created additional possibilities for world content; Natural-language nuance could be lost; Generated speech sometimes felt unnatural	T2; T3; T4
P11	Player-authored questions and choices increased perceived freedom; Puzzles and wider world content remained important; Further polish could strengthen the experience	T1; T3
P12	Further polish would improve the experience; Visual style affected evaluation	T3
P13	Natural AI responses were interesting; Interested in experiencing the approach within a completed game; Other players' experiences would influence personal interest	T2
P14	Interested in NLI as a method of driving narrative and gameplay	T3
P15	Needed clearer narrative direction; Difficulty determining appropriate questions	T3; T4
P16	Wanted greater ability to interact with characters in naturally preferred ways	T1; T2
P17	Viewed NLI as a modern extension of older adventure-game interaction	T3
P18	Conversational interaction could support exploration of secrets, mysteries and lore; Player's own communication could become part of gameplay	T1; T3

P19	Did not yet perceive sufficient benefit over standard dialogue options; Experimenting with abnormal AI responses became distracting	T3; T4
P20	Experience was novel and enjoyable; Learning curve provided some challenge while remaining manageable	NR
P21	Experience felt immersive; Perceived substantial potential for discovery	T1; T3
P22	Non-dialogue-tree interaction felt believable; Conversation supported immersion; Player needed to formulate questions to progress; Interaction appeared capable of greater depth	T1; T2; T3

(Figure 6.48)

6. Semantic Coding: Section 02, Question 10

Participant	Semantic Codes	RQ1 Theme Mapping
P1	Interaction differed from prior expectations; Speech interaction added another dimension to the experience	T3
P2	No participant entry	—
P3	Wanted to return to the game and continue playing	NR
P4	Experience was enjoyable; Written and spoken interaction were expected to feel different; Response delay could prevent natural conversational flow	T4
P5	NPC replies could be too long; NPC turn-taking felt unnatural when questions were followed by continued speech	T2; T4
P6	NPCs spoke for too long; Reading text became preferable to waiting for spoken delivery	T4
P7	Repeatedly activating text entry interrupted interaction; Suggested automatic text-box activation	T4
P8	Wanted additional support for remembering objectives; Suggested an objective display or player notepad	T3; T4

P9	Enjoyed the French-speaking NPC; Misinterpreted a narrative interaction as a technical problem before understanding its purpose	T3
P10	No participant entry	—
P11	Speech interaction was positively received; Responses could feel slow or prolonged; Wanted to continue playing	T2; T4
P12	No participant entry	—
P13	Interested in comparing how NPCs responded to different players; Expected individual conversations to produce different experiences	T1; T2
P14	Experienced fragmented or incorrect speech output; NPC turn-taking sometimes felt unnatural; Speech input occasionally failed to produce a response; Encountered technical errors	T4
P15	No participant entry	—
P16	No participant entry	—
P17	Enjoyed the concept and experience	NR
P18	Responded positively to level design and scope	T3
P19	No participant entry	—
P20	Expressed interest in future games using the concept	NR
P21	Strongly positive response; Offered assistance with visual development	NR
P22	Compared the interaction with fictional conversational environments; Considered possible non-game applications; Experience prompted reflection on future uses of the technology	NR

(Figure 6.49)

B. Semantic Coding of Section 03 Open-Text Responses

The thematic analysis drew upon the semantic coding of relevant Section 02 responses presented in Appendix 4A, together with the additional Section 03 open-text responses coded in Appendix 4B. Codes were considered in relation to RQ2 where they addressed player freedom, narrative influence, NPC realism, naturalness, contextual responsiveness, or the relationship between conversational interaction and wider game events.

1. RQ2 Key

T1	Free-Form Dialogue Increased Expressive Freedom, but Agency Depended on Consequence
T2	Believability Was Shaped by Narrative Context Rather Than Human Imitation
T3	Contextual Responsiveness and Situational Awareness Strengthened NPC Realism
T4	Technical and Scripted Limitations Disrupted Natural Interaction
NR	Code generated during analysis but not retained within a final RQ2 theme

(Figure 6.50)

2. Semantic Coding: Section 03, Question 11

Participant	Semantic Codes	RQ2 Theme Mapping
P1	No participant entry	—
P2	Perceived the experience primarily as a puzzler or metroidbrainia	NR
P3	Wanted visible NPC acknowledgement after task completion; Wanted maintenance bots to change after rebooting	T3
P4	Response delay was the main barrier to natural communication	T4
P5	Realism and naturalness were difficult to judge because characters were robots; Behaviour felt natural within the robot framing	T2
P6	Robot narrative context shaped expectations of realism; Did not judge interaction as human conversation because NPCs were treated as robots	T2
P7	NPCs had limited knowledge and situational awareness; NPCs failed to respond appropriately to surrounding events; Interaction felt pre-scripted	T3; T4

P8	Initial NPC speech followed its own direction regardless of player input; Conversation became more realistic after the opening exchange	T3; T4
P9	Interactions felt more organic than those in other games	T2
P10	NPC questions focused repeatedly on the player's name; NPCs did not show enough inquisitiveness	T4
P11	Conversations felt more organic than in other games; Response delay and limited awareness reduced naturalness	T2; T3; T4
P12	No participant entry	—
P13	Robot framing supported immersion and contextual believability; Some NPCs lacked relevant information; Reboot behaviour conflicted with player expectations	T2; T3; T4
P14	NPCs recognised changes in gameplay; Robot setting influenced perceptions of characters as less human and more mechanical	T2; T3
P15	No participant entry	—
P16	Wanted characters to know more about surrounding events	T3
P17	Robot framing made unusual AI responses more believable; Wanted to test system boundaries further	T2
P18	NPCs were convincing as robots; Awareness of nearby robots and objects strengthened the interaction	T2; T3
P19	No participant entry	—
P20	NPCs still felt somewhat scripted	T4
P21	Wanted NPCs to recognise the player's presence within nearby social situations	T3
P22	Attempted to break the conversational system but was unsuccessful	NR

(Figure 6.51)

C. Semantic Coding of Section 04 Open-Text Responses

The following tables provide the semantic coding used to support the reflexive thematic analysis of Research Question 3. Coding was conducted at a predominantly semantic level, focusing on meanings directly expressed within

participant responses. The analysis focused on the direct comparisons provided in Section 04 Question 3 and the additional observations provided in Question 8. Individual responses could receive multiple codes and contribute to more than one theme. Not every initial code was retained within the final thematic structure.

1. RQ3 Key

T1	Turing Was Perceived as More Flexible Than Earlier NLI Implementations
T2	Effective Understanding Supported Positive Evaluation Despite Occasional Errors
T3	Conversational Realism Depended on Depth, Naturalness and Contextual Knowledge
T4	NLI Effectiveness Was Judged Through the Possibilities It Enabled
NR	Code generated during analysis but not retained within a final RQ3 theme

(Figure 6.52)

2. Semantic Coding: Section 04, Question 03

Participant	Semantic Codes	RQ3 Theme Mapping
P1	No participant entry	—
P2	No participant entry	—
P3	No participant entry	—
P4	Previous game required specific keywords; Experimental game felt freer and more natural	T1
P5	Previous game used voice commands for substitutions and tactical changes	T1
P6	Previous systems used simple voice or language recognition; Experimental game allowed NPCs to expand or explain	T1; T4
P7	Previous voice implementation felt less developed and did not work as well	T1
P8	Experimental game's NPCs were perceived as performing better than previous experience with Siri	T1

P9	No participant entry	—
P10	No participant entry	—
P11	Experimental game was perceived as better than Facade	T1
P12	No participant entry	—
P13	No participant entry	—
P14	No participant entry	—
P15	No participant entry	—
P16	Experimental game understood varied spoken input better than previous Kinect-enabled games	T1; T2
P17	Experimental game was perceived as more sophisticated than older adventure-game text interaction	T1
P18	No participant entry	—
P19	Previous system focused on single-word input; Experimental game allowed broader interaction	T1
P20	No participant entry	—
P21	Previous voice interaction was simplified; Experimental game felt more complex and impressive	T1
P22	Previous system relied on prescribed spoken commands; Experimental game offered broader interaction and greater immersion	T1; T4

(Figure 6.53)

3. Semantic Coding: Section 04, Question 08

Participant	Semantic Codes	RQ3 Theme Mapping
P1	No participant entry	—
P2	No participant entry	—
P3	No participant entry	—
P4	Previous game required specific keywords; Experimental game felt freer and more natural	T1
P5	Previous game used voice commands for substitutions and tactical changes	T1

P6	Previous systems used simple voice or language recognition; Experimental game allowed NPCs to expand or explain	T1; T4
P7	Previous voice implementation felt less developed and did not work as well	T1
P8	Experimental game's NPCs were perceived as performing better than previous experience with Siri	T1
P9	No participant entry	—
P10	No participant entry	—
P11	Experimental game was perceived as better than Facade	T1
P12	No participant entry	—
P13	No participant entry	—
P14	No participant entry	—
P15	No participant entry	—
P16	Experimental game understood varied spoken input better than previous Kinect-enabled games	T1; T2
P17	Experimental game was perceived as more sophisticated than older adventure-game text interaction	T1
P18	No participant entry	—
P19	Previous system focused on single-word input; Experimental game allowed broader interaction	T1
P20	No participant entry	—
P21	Previous voice interaction was simplified; Experimental game felt more complex and impressive	T1
P22	Previous system relied on prescribed spoken commands; Experimental game offered broader interaction and greater immersion	T1; T4

(Figure 6.54)

D. Semantic Coding of Section 05 Open-Text Responses

The following tables provide the semantic coding used to support the reflexive thematic analysis of Research Question 4. Coding was conducted at a predominantly semantic level, focusing on meanings directly expressed within participant responses. The analysis focused on the explanations provided in Section

05 Question 5 and the additional observations provided in Question 8. Individual responses could receive multiple codes and contribute to more than one theme. Not every initial code was retained within the final thematic structure.

1. RQ4 Key

T1	Natural-Language Input Increased Personal Expression and Immersion
T2	Intuitive Interaction Could Still Create Practical and Social Friction
T3	Removing Dialogue Restrictions Created a Trade-Off Between Freedom and Guidance
T4	NLI Was Viewed as Expanding Game-Design Possibilities Rather Than Universally Replacing Existing Interaction
NR	Code generated during analysis but not retained within a final RQ4 theme

(Figure 6.55)

2. Semantic Coding: Section 05, Question 05

Participant	Semantic Codes	RQ4 Theme Mapping
P1	Natural speech reduced the need to process on-screen information; Interaction could reduce interface overheads	T4
P2	Greater control over wording, tone, and intent; Predefined dialogue could misrepresent intended expression	T1; T3
P3	Player could choose exactly what to say rather than select from broad predefined responses	T1; T3
P4	Interaction felt player-driven and personal; Did not clearly regard the approach as either progression or regression	T1; T4
P5	Absence of predefined options reduced narrative-tree guidance; Player felt greater control over interaction	T1; T3
P6	Player could phrase questions in their own way; Predefined dialogue could produce unintended character responses	T1; T3
P7	Interaction supported more dynamic conversation and reduced repetitive dialogue	T1

P8	Player could say what they wanted and ask questions relevant to their immediate thoughts	T1; T3
P9	Predefined dialogue could remain appropriate for controlled stories; Dynamic dialogue felt fluid and natural; Saw potential application in other games	T1; T3; T4
P10	Dialogue trees restricted expression of player personality and characterisation	T1; T3
P11	Natural-language interaction felt more dynamic and personal than selecting options	T1
P12	Removal of semi-linear dialogue restrictions increased immersion and supported natural communication	T1; T3
P13	Interaction felt fluid and immersive; Player could respond naturally rather than select from a menu	T1
P14	Greater agency and customisation of player responses	T1; T3
P15	Player could pursue information according to their own questions; Interaction accommodated individual approaches; Interested in alternative player agendas	T1; T4
P16	Natural-language interaction allowed communication closer to ordinary conversation rather than selecting predetermined lines	T1; T3
P17	Strong preference against pre-written dialogue-tree interaction	T3
P18	Approach may suit some players better than others; Not every game should use this interaction model	T4
P19	Free-form interaction made desired information harder to obtain; Traditional dialogue provided clearer guidance about NPC knowledge	T3
P20	Natural-language commands perceived as becoming increasingly common	T4
P21	Interacting through natural language felt instinctive and similar to speaking with another person	T2
P22	Free-form interaction required greater consideration of how questions were phrased; Saw potential for	T3; T4

	gameplay involving NPC knowledge and deceptive responses	

(Figure 6.56)

3. Semantic Coding: Section 05, Question 08

Participant	Semantic Codes	RQ4 Theme Mapping
P1	Natural-language interaction could reduce reliance on menus and tutorials; Responsive conversation could support stronger NPC personality; Identified wider design applications	T4
P2	No participant entry	—
P3	No participant entry	—
P4	No participant entry	—
P5	Shared environment discouraged spoken interaction; Identified applications in racing and tactical games	T2; T4
P6	No participant entry	—
P7	No participant entry	—
P8	No participant entry	—
P9	No participant entry	—
P10	No participant entry	—
P11	No participant entry	—
P12	No participant entry	—
P13	Felt awkward speaking aloud; Modified speech to improve recognition; Altering speech reduced perceived naturalness	T2
P14	Used spoken input exclusively; Wanted conversational differences to affect narrative outcomes; Repeated outcomes could reduce perceived impact on the game world	T4
P15	No participant entry	—
P16	No participant entry	—

P17	Expected natural-language interaction to become a primary method of NPC interaction in future games	T4
P18	No participant entry	—
P19	No participant entry	—
P20	Expected wider future adoption of the interaction approach	T4
P21	Believed similar NPC interaction could improve existing games	T4
P22	Expected different genres to benefit to different degrees; Saw potential application across multiple game genres and beyond games	T4

(Figure 6.57)