

Exploration-Based Narrative Puzzle Game with Educational Elements

09 July 2026 16:09

ASSIGNMENT 1

Innovation & Research

Module Name: Changemakers: Creativity and Value Creation

Module Code: ACCA5033

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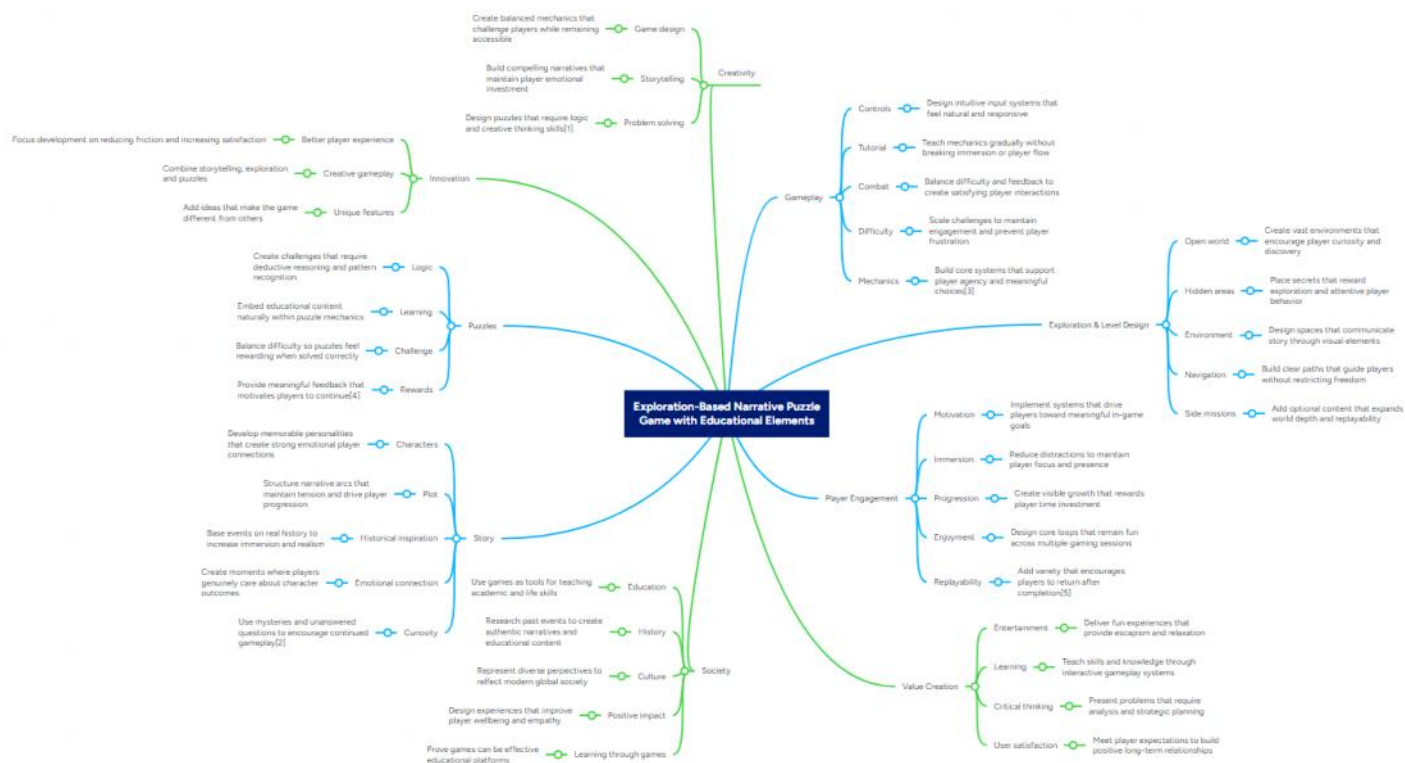
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Q1 - Mind Map: Creativity, Innovation, Society and Value Creation

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Task 1.1: Academic analysis of the mind map

Creativity and innovation are fundamental pillars for the advancement of modern society and individual development, as they directly shape how knowledge is communicated and assimilated. In the realm of digital technology and computing, video games have evolved from simple forms of entertainment into complex, interactive learning tools capable of generating significant social value. As the preceding mind map illustrates, applying innovation to gameplay and mechanics actively lowers barriers for the player and enhances long-term user satisfaction.

Designing complex challenges within a digital environment requires a deep integration of logic and creative thinking, prompting players to employ deductive reasoning and pattern recognition to progress. Video games provide environments conducive to this cognitive development. According to Schell, harmonizing intuitive mechanics with structured problem-solving is essential to maintaining player interest while they acquire practical skills [1]. Likewise, incorporating engaging narrative structures helps sustain a high level of emotional involvement, fostering intrinsic motivation through mystery and narrative progression [2].

To maximize value creation and social impact, core game mechanics must carefully balance challenge and skill. When interactive systems achieve this optimal balance, players enter a state of deep concentration that facilitates knowledge acquisition [3]. Furthermore, designing systems that prioritize player agency and meaningful decision-making ensures the experience remains deeply rewarding, transforming traditional gaming into a problem-solving activity [4]. Consequently, by transforming educational content into an interactive ecosystem, video game design contributes directly to the common good, demonstrating that games serve as effective platforms for modern literacy and cognitive growth in a diverse global society [5].

Task 1.2: Project justification and connection to the mind map

The concept selected for development is a narrative-driven puzzle game based on exploration and integrated with educational elements. The game will allow users to explore meticulously detailed environments, solve complex logic puzzles, and discover historical and cultural information through an interactive narrative. The fundamental goal of this project is to investigate how to combine exploration, narrative, and problem-solving mechanics to create an engaging experience that simultaneously offers opportunities for authentic learning. Unlike traditional commercial games, which focus primarily on combat or competition, this project prioritizes curiosity, discovery, and knowledge acquisition through active gameplay. To achieve this, core systems must foster player agency and allow for meaningful choices, ensuring the gaming experience is rewarding rather than restrictive; this principle is a key aspect of current video game design frameworks. The connection between this proposal and the mind map is grounded in the concept of value creation. To maintain player attention and immersion, the game's core dynamic relies on balancing challenge and feedback. If a puzzle is too simple, the player becomes bored; if it is excessively difficult, they experience frustration. Striking this balance is crucial for maintaining a state of deep concentration and an optimal experience during interactive tasks. Furthermore, the innovation lies in the combination of education and interactive gameplay, naturally integrating academic content into the puzzles to avoid a sense of artificiality. By offering an environment that rewards player attention, exploration fosters critical thinking. Ultimately, this approach demonstrates that video games can serve as highly effective learning platforms, highlighting that interactive environments are powerful tools for modern literacy and cognitive development.

Task 2.1: Project Aim and Objectives and Research Area Context

Project Area:

An exploration-based narrative puzzle game incorporating educational elements

Research Area Context:

The selected research area focuses on the conceptual design and academic analysis of an exploration-based narrative puzzle game that integrates educational elements. This project investigates how the exploration of open-world environments, interactive storytelling, and problem-solving mechanics can be systematically combined to offer a highly engaging user experience while creating distinctive learning opportunities. The foundational research critically examines how creative game design decisions influence cognitive development, player curiosity, emotional connection, and long-term knowledge retention within a modern computing framework.

Project Goal:

The ultimate goal of this project is to develop a robust conceptual design proposal and a theoretical research framework for an interactive video game that seamlessly blends exploration, narrative puzzle design, and educational content to foster critical thinking and user engagement.

Project Objectives:

To successfully achieve this primary goal, the project will pursue the following academic and practical objectives:

1. To evaluate contemporary theories regarding interactive storytelling and narrative design to determine how branching storylines and character connections enhance player emotional engagement.
2. To formulate a structural framework for puzzle mechanics and problem-solving challenges that balances difficulty and feedback, thereby directly supporting critical thinking without causing user frustration.
3. To investigate methodologies for naturally integrating educational elements and historical data into gameplay loops, ensuring that knowledge acquisition aligns with the player's intrinsic enjoyment.
4. To identify, justify, and execute an appropriate research strategy (including a pilot data collection instrument) to capture user feedback, enabling an empirical assessment of how integrated design features contribute to value creation.

Conclusion of Objectives:

These five objectives provide a comprehensive and structured direction for the project, directly linking creative video game development with rigorous research methods. The ultimate approach transcends the creation of an entertaining digital product; it aims to offer a validated model demonstrating how modern interactive media can support active learning, human engagement, and the creation of social value.

Task 2.2: Justification of Research Philosophy

For the successful execution of this project, an interpretivist research philosophy is formally adopted. Interpretivism posits that reality is socially constructed and that individuals assign highly subjective meanings to their personal experiences. Within the specific domain of computer science and creative technology, game design and player engagement are inherently subjective phenomena. What one individual perceives as an immersive narrative or rewarding puzzle may be experienced as frustrating or unappealing by another player. Therefore, using a highly objective or rigid scientific lens, such as positivism, would be fundamentally inappropriate for this study, as it ignores the nuances of human emotion and cognitive interaction.

By utilizing an interpretivist framework, this research aims to explore and understand the deeper, underlying meanings behind players' behaviors, internal motivations, and individual learning patterns during gameplay. This approach allows for a richer, more human-centered assessment of how users interact with digital media. In the context of an exploration-based educational game, interpretivism provides the qualitative depth needed to analyze how players actively construct knowledge from historical narratives and how environmental design elements influence their curiosity. According to Saunders et al., selecting an appropriate research philosophy is vital because it shapes the entire methodological strategy and determines how data is interpreted [6]. Consequently, this philosophy ensures that the evaluation of the proposed game concept focuses on the quality of the user experience and the authentic value created during interactive sessions, rather than reducing human participation to mere statistical metrics.

Task 2.3: Academic search tools and Boolean strategies

Search tools and research databases

To conduct rigorous academic research for this project, various search tools and specialized databases will be systematically used to identify relevant information on narrative puzzle games based on exploration, player engagement, and educational game design.

- Google Scholar: This will be used to locate academic articles, books, and research papers related to video game design, player experience, and game-based learning. It offers access to a wide range of academic sources that underpin the project's theoretical framework.
- ACM Digital Library: This will be employed to find research related to computer science, human-computer interaction, and interactive media. This database is highly useful for exploring how users interact with digital systems and how specific game mechanics influence player behavior.
- IEEE Xplore: This will be used to identify technical research related to technology, software engineering, and interactive systems. It provides essential information on the technical aspects involved in creating robust digital experiences.
- ScienceDirect: This will also be consulted to review research articles on education, cognitive psychology, user experience, and the direct impact of digital games on learning.

Research search strategies and Boolean applications

To identify highly relevant research, advanced search strategies will be applied. Keywords related to the project's scope will be combined using Boolean operators such as AND and OR to drastically improve search precision and filter out commercial data.

The practical application of these search terms allows for the direct retrieval of the foundational literature required for this framework:

- "video game design" AND "player engagement"—this strategy enables the location of validated design frameworks that explore how the balance between rule systems and cognitive challenges maintains player interest without causing user fatigue [7].
- "educational games" AND "learning outcomes": this search string leads directly to peer-reviewed empirical literature on the integration of learning into serious games, demonstrating how the educational context fosters information retention [8].
- "interactive storytelling" AND "video games": this combination retrieves seminal works on how game worlds and narrative structures interact to maintain player engagement [9].
- "puzzle mechanics" AND "problem-solving": this search focuses on technical articles regarding logical structures, deductive reasoning, and cognitive progression paths within interactive environments.

Other strategies will involve applying strict filters within databases—such as publication date, academic relevance, and the selection of peer-reviewed sources. Initially, titles and abstracts will be reviewed to determine research relevance before the full articles are analyzed.

Employing these comprehensive search methods ensures the acquisition of reliable, evidence-based knowledge. This academic framework will directly support the project's development by demonstrating how exploration, narrative, and puzzle-solving mechanics can create an engaging and highly educational interactive experience.

Task 3.1: Research Quality Framework and Ethical Considerations

To ensure that this research yields authentic, methodologically sound, and meaningful results, several fundamental research parameters will be strictly observed during the empirical phase:

Validity: Validity determines whether the selected research instruments accurately measure the specific variables they are designed to analyze [10]. In this computing project, construct validity is optimized by ensuring that each questionnaire item directly correlates with the exploration of the environment, the interactive narrative, puzzle-solving mechanics, and educational value. This close alignment ensures that the collected data provide practical and useful insights for the system's final architecture.

Reliability: Reliability refers to the consistency, replicability, and stability of research findings. To maximize reliability, a standardized data collection protocol is applied: all participants will interact with the same questions, presented via a uniform online interface. This mitigation strategy minimizes external administrative bias, ensuring that results can be reliably examined and compared.

Generalizability: Generalizability addresses whether findings obtained from a localized sample can be projected onto a broader target population. To enhance external validity, opinions will be deliberately gathered from individuals with diverse gaming experiences, age groups, and cultural preferences. Fostering a heterogeneous sample ensures a broader and more realistic understanding of how different users respond to digital educational environments.

Ethical Considerations: Ethical protocols are fundamental when conducting research involving human subjects. In strict compliance with institutional guidelines, all participants must actively complete an informed consent form prior to participation. Total data anonymity and confidentiality are guaranteed; no sensitive personal or financial records, nor data allowing for personal identification, will be collected. Furthermore, participants retain the absolute right to withdraw from the study at any time without facing negative repercussions. By incorporating these specific measures, the project aligns with standard academic practices, thereby ensuring a high degree of reliability and legal compliance regarding the final data [11].

Task 3.2: Mixed-methods strategy and pilot survey design

This research project systematically employs a combination of quantitative and qualitative methodologies to gather empirical data on user preferences and interactive experiences. The mixed-methods approach is highly suitable, as it allows for the simultaneous collection of statistical and numerical trends alongside deep, subjective personal insights [12]. This dual approach provides a comprehensive, multidimensional understanding of player engagement levels and the design of modern educational games.

The primary data collection instrument selected is a self-administered online questionnaire, chosen for its efficiency in gathering large amounts of user data within a short timeframe. Quantitative metrics are obtained using closed-ended rating scales (5-point Likert scales) to easily identify behavioral patterns. Concurrently, qualitative information is gathered through open-ended response fields, encouraging participants to suggest structural improvements to game mechanics.

Task 3.3: Data Analysis Methodologies

Quantitative Data Analysis

Quantitative analysis focuses on the statistical processing of numerical datasets derived from standardized empirical methods [13]. For this project, quantitative data collected via closed-ended Likert scales and multiple-choice questions will be analyzed using descriptive statistics, including percentage distributions, mathematical averages, and graphical representations. Visualizing these statistical results makes it possible to clearly identify which specific features—such as spatial exploration, narrative arcs, or logic puzzles—the target demographic considers most important. This facilitates a data-driven assessment of which architectural components contribute most significantly to maintaining user satisfaction.

Qualitative Data Analysis

In contrast, qualitative analysis examines non-numerical data to decipher the specific subjective reasons underlying participant behavior. Textual narratives drawn from the survey's open-ended response fields will be analyzed using thematic analysis. Responses will be transcribed, coded, and categorized into prevailing conceptual themes, such as "player immersion factors," "educational friction points," and "narrative pacing preferences." This systematic approach reveals the underlying motivations shaping players' opinions, adding qualitative depth to the technical aspects of the game mechanics.

Ultimately, synthesizing both analytical frameworks ensures a comprehensive interpretation of the user experience: numerical metrics allow for the identification of macro-trends, while qualitative information provides the insights needed to develop the final educational product.

References:

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Appendix A - Pilot Survey

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Introduction to the Research Study

This pilot questionnaire aims to gather preliminary empirical data regarding user preferences, cognitive engagement, and interaction expectations for exploration-based narrative puzzle games that integrate educational mechanics. Your responses are anonymous and confidential and will directly inform the system architecture of the final project.

Question 1 (Quantitative – Behavioral filter)

How frequently do you actively interact with digital video games that incorporate spatial exploration or adventure mechanics?

☐ Daily

☐ Weekly

☐ Monthly

☐ Rarely

☐ Never

Question 2 (Quantitative – Closed-ended multiple choice)

Which structural component do you consider the primary factor in maintaining player interest in modern interactive media? (Select the predominant factor)

☐ Spatial discovery, environmental immersion, and open-world exploration.

☐ Narrative depth, branching storylines, and character emotional arcs.

☐ Deductive puzzle mechanics, logic challenges, and cognitive problem-solving.

☐ Core gameplay loops, physical controls, and immediate system feedback.

Question 3 (Quantitative – 5-point Likert scale)

To what extent do you agree with the following statement?: "The seamless integration of gamified educational elements and historical contextual data actively enhances the qualitative value of the video game experience."

☐ 1 - Strongly disagree

☐ 2 - Disagree

☐ 3 - Neutral

☐ 4 - Agree

☐ 5 - Strongly agree

Question 4 (Qualitative – Open-ended response)

Based on your personal experience as a player, specify which concrete structural design features or aesthetic elements contribute to making a digital interactive experience memorable, rather than repetitive or artificial. Response area:

Question 5 (Quantitative – 5-point Likert scale)

To what extent do you agree with the following statement?: "I would dedicate time and show interest in participating in a digital game concept that explicitly combines space exploration, logic puzzles, and the acquisition of historical or cultural knowledge."

☐ 1 - Strongly disagree

☐ 2 - Disagree

☐ 3 - Neutral

☐ 4 - Agree

☐ 5 - Strongly agree

Statement on the utility of the pilot instrument

The preliminary data and structured feedback collected through this pilot questionnaire will be used systematically to calibrate the project's final scope. Analyzing these responses allows for the early identification of key user expectations, the empirical refinement of future primary data collection activities, and the optimization of core game mechanics prior to developing the large-scale framework.