Transcending the Visual Labyrinth: Rethinking Action RPGs Through Art with Inclusive Sound Design for Blind People

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Abstract. Introduction*: This work presents the development of the game Theseus' Odyssey, a digital Role-Playing Game (RPG) based on the myth of Theseus, designed to be accessible to totally blind gamers. The game's audiovisual design and development encompass pedagogical and accessibility guidelines designed to prioritize auditory feedback as the primary channel of information.* ***Objective:*** *To facilitate the inclusion and strengthen the interaction of non-sighted players through the design of the first version of the game, integrating narrative, full voice acting, directional 3D audio, and sonification.* ***Methodology:*** *The research method adopted to create this digital game as a main artifact is based on Design Science Research (DSR), aiming to design, create, evolve, and evaluate the game over time.* ***Results:*** *The development of Theseus' Odyssey provides technical evidence that including non-sighted players does not require simplifying game mechanics. Instead, it demonstrates the feasibility of a competent intersemiotic translation of system feedback into auditory channels, utilizing 3D directional audio and full voice acting as pillars for inclusive immersion and autonomous navigation.*
Keywords: *Game Accessibility, Blind Players, Audiogames, Inclusive Design.*

1. Introduction

Digital games are recognized as powerful learning tools, capable of keeping players engaged, improving cognitive capacity, enhancing collaboration, and competition among individuals [Baptista *et al*. 2024]. Beyond education, these pedagogical applications promote complex social interaction networks and are incorporated into the healthcare sphere, assisting in motor and cognitive rehabilitation and mental health [Merry *et al*. 2012; Anguera *et al*. 2013; Wattanasoontorn *et al*. 2013; Laver *et al*. 2017]. Given this multiplicity of applications, the design of these digital games must be inclusive, ensuring that access barriers do not deprive blind individuals of cultural and social benefits.

Blindness is characterized by a lack of visual perception, which fundamentally alters an individual's understanding of the world. Consequently, non-sighted individuals can acquire knowledge and be included in the same contexts as sighted people through alternative *stimuli* that facilitate accessibility, such as tactile or auditory cues [Amiralian

1992]. A widely used accessibility definition for the web is that of the World Wide Web Consortium's (W3C), which defines it as: "the possibility and condition of reach, perception and understanding for utilization, in equal opportunity, with safety and autonomy, of the physical environment, transportation, information, and communication, including information and communication technology, as well as other services and facilities" [W3C 2014].

The adaptation and application of accessibility guidelines designed for the blind community in digital games improves their inclusion in this medium [Junior *et al.* 2025]. For example, the digital game The Last of Us: Part II features accessibility options tailored for blind players, such as Text-to-Speech conversion, automatic aim/target, combat and movement sounds, navigation assistance, and other features [Naughty Dog 2020].

In the United Kingdom, research conducted by the Scope organization revealed that 66% of surveyed players with visual impairments reported some kind of barrier or problem while playing digital games. The limited availability of assistive technologies, alongside consoles and games lacking accessibility, represents a significant impediment for these players [Scope 2020]. From this perspective, accessibility is a quality attribute and a crucial feature for digital games, as it ensures that everyone can fully engage with the content [Coutinho 2012]. Furthermore, integrating accessibility planning during game development is fundamental to avoid exclusion, considering that digital games not designed for inclusion can become a source of difficulty or an outright barrier [Pereira *et al.* 2018].

Aiming to facilitate inclusion and provide entertainment for blind individuals, this article's main objective is to present the digital game *Theseus' Odyssey*. The Design Science Research (DSR) methodology was adopted to conceptualize, design, develop, and iteratively evaluate the game as the primary artifact [Pimentel *et al.* 2020; Fullerton 2024]. Thus, the first version of the game was designed incorporating elements of Greek mythology based on the myth of Theseus, alongside the following accessibility guidelines from Soares *et al.* (2024) *apud* Junior *et al*. (2025): I) Provide the option to pause the game; II) Avoid superfluous animations; III) Present the game's context; IV) Provide guidance to assist in the execution of the game; V) Insert elements of incentive or motivation; and VI) Use previously assimilated knowledge.

To promote the inclusion of blind players in *Theseus' Odyssey*, the techniques implemented include voice acting, audio description, and directional 3D audio. This approach addresses two of the Grand Research Challenges in Games and Entertainment Computing for 2020–2030: accessible game design and human factors evaluation [Santos and Hounsell 2023]. In addition, such an approach aims to empower players with complete vision loss to have an immersive and autonomous gameplay experience, contributing to their cultural and historical development.

The remainder of this article is organized as follows: Section 2 (Literature Review), presents core concepts regarding audiovisual accessibility and its integration into digital games; Section 3 (Methodology), describes the game's art and design phases, along with the adopted accessibility guidelines; Section 4 (The Development of

the Digital Game *Theseus' Odyssey*) details the game's technical implementation and the results of applying the guidelines; and Section 5 (Conclusion), presents final considerations and future work.

2. Literature Review

The design of a digital game requires the definition of rules and mechanics established by the game designer, which shape the user experience and cover both aesthetic and structural aspects [Adams 2014]. The fundamental concepts utilized in this work are: (i) **Top-Down view**: a visibility system that displays the game world from a perspective directly above the player's head, pointing downwards [Adams 2014]; (ii) **Pixel Art**: a style of 2D digital art in which each pixel is intentionally positioned to create the visual aesthetic, widely used in indie games due to its technical efficiency and nostalgic appeal [Silber 2015]; (iii) **Role-Playing Game (RPG)**: a gameplay category in which players are required to follow well-defined rules and complete missions that involve combat or puzzle-solving in order to improve their characters [Adams 2014]; (iv) **Semi-Open World**: characterized by comprehensive, non-linear exploration of the environment, where the game world is divided into regions that offer the player significant freedom to interact [Barbosa 2014]; (v) **Inventory System**: a widely adopted mechanic designed to store, organize, and display a character's items [Meirelles *et al*. 2022]; and (vi) **Quest System**: the act of a player navigating the game world to achieve an objective while facing a series of challenges [Howard 2022].

In addition to design, **Narration** acts as an interactive process that goes beyond the verbal, integrating non-verbal and contextual elements to organize human experience and social knowledge [Santos *et al*. 2019]. Furthermore, **Voice Acting** in digital games serves as an intersemiotic translation technique, converting environmental visuality into auditory meaning. Through vocal interpretation, this technique builds mental images that compensate for the lack of vision [Melo 2024; Alburger 2019]. Given the neural plasticity of blind individuals, the voice becomes the most effective means of conveying orientation and tasks in real time [Agrimi *et al*. 2024].

To foster engagement, accessibility in digital games aims to remove barriers that hinder the interaction of individuals with disabilities, which is fundamental to guarantee their access to social, technical, and historical-cultural inclusion [Coutinho 2012; Soares *et al*. 2024]. Specifically concerning gamers without sight, Agrimi *et al*. [2024] point out that the main solutions involve sensory substitution, such as the use of Text-to-Speech (TTS) systems and spatial sonification. Despite recent progress, many digital games still fail to offer adequate non-visual feedback, making the gameplay experience frustrating or impossible for non-sighted players [Pereira *et al*. 2018].

Audio plays a central role in games by compensating for the lack of sight. Collins [2008] argues that digital game audio must go beyond merely setting the atmosphere, acting instead as a primary information channel regarding gameplay. A versatile auxiliary method for achieving this goal is 3D audio, which enables users to locate objects in space solely through sound [Junior and Forte 2014]. In audiogames or adapted games, the use of 3D audio enables players to locate objects and enemies in a virtual space without visual assistance. This technique is essential for autonomous

navigation in three-dimensional environments [Chaves and De Ávila 2017]. According to Junior and Forte [2014], **3D audio (binaural audio)** allows players to orient themselves within the virtual environment by identifying the distance of a sound source and its position relative to their own. To implement this, virtual emitters and listeners are utilized to simulate human auditory perception in 360 degrees.

In this context, **Sonification** in digital games is understood as the use of sound to convey information and provide immediate feedback regarding the system's state and player interactions [Collins 2008]. Sonification acts as a functional channel that converts game data (such as proximity to danger, health levels, or the occurrence of collisions) into non-verbal acoustic cues. This technique is essential for accessibility because it allows players to build a mental map of the environment and make decisions based on variations in sound properties, such as pitch, rhythm, and volume. This ensures that critical gameplay events are perceptible without the need for visual cues.

According to Agrimi *et al*. [2024], **Text-to-Speech (TTS)** is a voice synthesizer that narrates written elements; while it promotes interactivity, it can also slow down the flow of gameplay. Although TTS serves a utilitarian role in menu reading, **Human Voice Acting** becomes fundamental by adding emotional interpretation and context, thereby ensuring the player's narrative immersion.

Audiogames stand out in this landscape as disruptive games that go beyond simple adaptations, with sound serving as their central mechanic. According to Oliveira *et al*. [2015], audiogames do not rely on visual cues, using audio instead to entirely represent game events and feedback. Consequently, audiogames are classified into two categories: pure, which lack a graphical interface; and hybrid, which retain visual elements but incorporate redundant audio to ensure a complete gameplay experience for blind individuals.

3. Methodology

Design Science Research (DSR) is a research method that combines the development of base artifacts with the production of theoretical knowledge to solve practical problems in specific contexts [Pimentel *et al*. 2020]. The goal is to design modified realities, ensuring that technological innovation systematically generates rigorous scientific knowledge through the development and use of a primary artifact. This research is classified as an applied study focused on designing and improving the digital game *Theseus' Odyssey* as the primary artifact (Section 4). Initially, the focus lies on applying the knowledge gained from the studies cited in the literature review to the domain of accessibility for the blind gaming community, adopting the steps of the DSR method [Oliveira *et al*. 2021; Pimentel *et al*. 2020].

From this perspective, the creation of the primary artifact (the digital game) evolves iteratively. It begins with a prototype within the context of game design, consisting of a low-fidelity functional model focused on testing and validating the core mechanics prior to full-scale development, as well as establishing an Alpha version. The Alpha version represents a development milestone where all features and assets of the digital game are implemented and functional, ensuring that no new mechanics are added, leaving only final revisions and bug fixes for future evaluations [Fullerton 2024].

Given that the digital game is undergoing continuous improvement, the DSR steps were applied partially. Thus, the first version of the game *Theseus' Odyssey* (the primary artifact) was designed and developed guided by the pedagogical and accessibility guidelines proposed by Junior *et al.* (2025), integrating them into an iterative design cycle for future qualitative empirical evaluations.

Figure 1 illustrates the steps and the methodological flow of the research, adapting the DSR phases to the game development context. The solid-line boxes indicate the completed steps of this first iteration of the artifact, while the dashed-line box represents future steps for the improvement of the project.

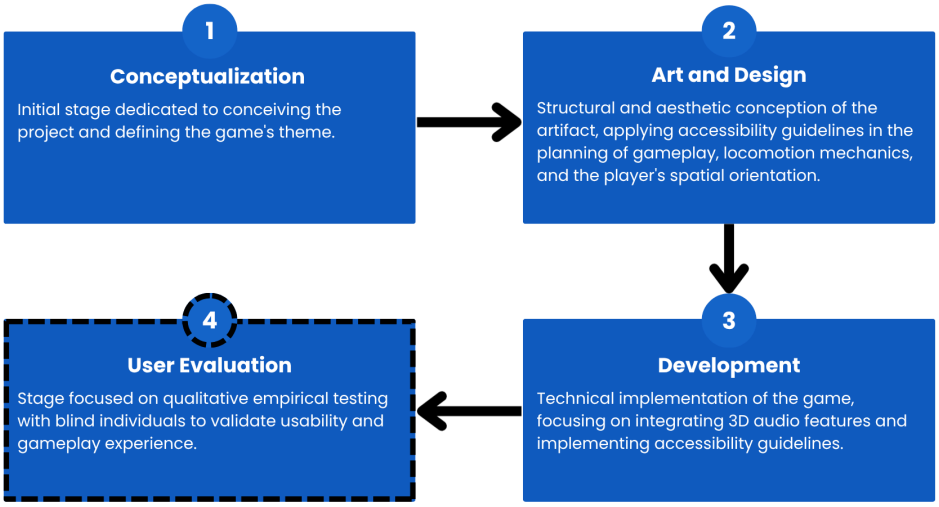

Figure 1. DSR-based methodological flow. Source: The authors.

3.1. Accessibility Guidelines Adopted

Game developers frequently face tight deadlines to finish a product, often sacrificing their personal time to meet these deadlines. This acts as a demotivating factor for investing time in accessibility features for their games [Carvalho 2022]. Given the current landscape of the game industry, totally blind individuals generally do not play computer games primarily because these games rely on visual cues to convey information [Chaves and De Ávila 2017]. Consequently, the importance of conveying information through audio in the development of games for blind players is emphasized, ensuring that players can orient themselves and understand the game's current state.

The research by Chaves and De Ávila [2017] highlighted how powerful audiogames can be in the development of accessibility for blind individuals. Game events, along with user feedback, are transmitted via sound, eliminating the need for visual cues for progression. Their work emphasizes the necessity of planning in audiogame development to ensure that these games become truly accessible to blind players. In light of these considerations, the pedagogical and accessibility guidelines adopted in this work, provided by Junior *et al.* (2025), are detailed as follows:

I. **Provide the option to pause the game**: Present navigation alternatives allowing the player to pause the game when there is any moving information that starts

automatically, lasts more than five seconds, and is presented in parallel with other content;

II. **Avoid superfluous animations**: Avoid animations or allow them to be disabled, unless the animation is essential to the functionality or to the information being transmitted;
III. **Present the game's context**: Use audio description to convey information, structure, and relationships, such as features and rules;
IV. **Provide guidance to assist in the execution of the game**: Present information, structure, and relationships to convey what is happening on the screen in real time;
V. **Insert elements of incentive or motivation**: Recognize and celebrate players' achievements, providing rewards for correct answers; correct the player gently, encouraging them to continue the activities;
VI. **Use previously assimilated knowledge**: Provide previously assimilated sounds to guide the player in the game and allow, whenever possible, for them to create customized sound catalogs.

The aforementioned guidelines were encompassed in the design and refinement of the game *Theseus' Odyssey*, in conjunction with the crucial role that auditory feedback plays in accessibility for blind individuals. This approach contributes to amplifying the potential for genuine inclusion of the target audience by leveraging the implemented audiogame technology.

3.2. Assistive Technologies

To ensure an engaging, responsive, and accessible experience, design guidelines were established to define the game's interface, gameplay, and art style, with a specific focus on audiovisual accessibility. Accordingly, accessibility elements based on these guidelines (developed from systematic reviews and surveys) were integrated to facilitate the inclusion of blind individuals in the game [Junior *et al*. 2025]. Several accessibility features were implemented, as outlined in Table 1.

For the spatial representation and aesthetic of the game *Theseus' Odyssey*, a top-down perspective was selected in conjunction with a pixel art style. Within the context of a game focused on accessibility for blind players, this orthogonal 2D view transcends a purely aesthetic choice: it simplifies the navigation mesh and facilitates the mathematical mapping of two-dimensional coordinates into the directional 3D audio system. Consequently, it enables players to construct a more precise and coherent mental model of their surroundings, translating the current game state into consistent auditory feedback regarding obstacles and objects.

The primary genre defining the fundamental gameplay structure of *Theseus' Odyssey* is the RPG, utilizing narrative progression guided by a quest system, item inventory management, and combat dynamics. The adoption of a semi-open world was a strategic design decision intended to provide the freedom of exploration intrinsic to RPGs, further immersing the player in the mythology of Theseus, while segmenting the environment into cognitively manageable areas. This delimited scope avoids sensory

overload and prevents spatial disorientation, aligning with the requirements of non-visual navigation.

Regarding accessibility and interface, all text, dialogue, and menu options underwent a full process of voice-over and narration, eliminating reliance on visual reading. The use of a descriptive narrator, combined with characters featuring distinct vocal performances, functions as a vital intersemiotic translation. This approach not only conveys functional system information but captures the emotional tone of the plot with narrative clarity, fostering deep and autonomous engagement for blind players (the target audience) [Alburger 2019; Agrimi *et al*. 2024; Melo 2024].

4. Development of the Digital Game Theseus' Odyssey

Theseus' Odyssey[1] was developed using the GameMaker Studio 2 engine[2]. The engine was used for managing 2D elements and sound asset manipulation. The accessibility guidelines were implemented over the development stage, and the sound was projected to prioritize sound feedback as a primary information channel. Table 1 describes the current and planned features to be implemented in the game based on the guidelines.

Table 1. Accessibility features.

Feature	Associated Guidelines	Specification	Current Implementation Stage
Adapted Controllers	I, II, III	The game offers voice navigation settings, dynamic tutorials that narrate in-game events and explain the commands via audio, and a system that conveys the auditory context of the game state through 3D audio and narration while the game is paused.	Partially Implemented
Full Voice-over and Narration	III, IV, V	All text, dialogue, menu options, and environmental descriptions feature full voice-overs to eliminate reliance on visual information. Success and failure feedback is also provided through motivational audio cues upon task completion.	Implemented
3D Directional Audio and Sonification	III, IV	Spatialized audio is utilized to guide the player; objects and points of interest emit audio cues to indicate their positions. Furthermore, wall collision sounds facilitate spatial orientation within the environment.	Implemented

[1] First version of *Theseus' Odyssey*, available to play at: https://ledesgames.itch.io/theseus. INPI registration: https://drive.google.com/file/d/1u43lgP-aeZzwPto1xYkkaiShgRpC6VWS/view.
[2] Available at: https://gamemaker.io/en

Feature	Associated Guidelines	Specification	Current Implementation Stage
Audible Collision Feedback	IV, VI	The system emits distinct and consistent audio cues for each of the four cardinal directions (up, down, left, right) upon collision detection, facilitating the mental mapping of the environment.	Implemented
Accessible Interface and Inventory	I, III, IV	Arrow-key navigable menus and inventory systems featuring dedicated audio cues for each option or selected item, ensuring player autonomy from the game's initialization.	Partially Implemented
Quest System	III, IV	The system narrates every context and objective, and gives auditory clues by the environment so that the player can progress in the game.	Not Implemented
Combat System	IV	The combat system allows the identification of enemies by their dynamic spatialized audio, which is differentiable from any other.	Not Implemented

Thus, the implementation of accessible auditory features will be further discussed.

4.1. 3D Directional Audio Design

The implementation of 3D directional audio was achieved through GameMaker Studio 2's native spatial audio system, utilizing audio emitters and a 3D listener positioned at the character's coordinates. The 3D audio system is initialized with specific parameters: a maximum hearing distance of 300 pixels, an attenuation start distance (falloff) of 100 pixels, and an attenuation factor of 14. An exponential attenuation model was selected to provide a gradual and natural volume decay as distance increases, allowing players to intuitively perceive the proximity of sound sources.

Each collectable item and point of interest in the game features a dynamically created audio emitter. The system manages the creation, positioning, and real-time updates of these emitters, synchronizing their coordinates with player progress and the state of interactive objects. The 3D listener is updated on a per-frame basis, tracking the character's position. This implementation enables players to localize objects within the virtual space through volume variations and stereo panning, effectively simulating human binaural auditory perception.

The sonification system utilizes distinct audio cues to indicate both the proximity and the type of object, including: (i) continuous bubble sounds emitted by collectable items; (ii) proximity-triggered bubble sounds, activated when the player is near an item; and (iii) unique, item-specific audio cues triggered upon collection.

4.2. Voice-over/Narration and Collision Audio Feedback Systems

All text, dialogue, and menu options received voice-overs and/or narration to eliminate any reliance on visual reading. The game's accessible main menu utilizes a data

structure to store options, alongside an arrow-key navigation system that cycles through them, playing the corresponding audio cue for each, and uses the "Enter" key for selection. This is designed to enable blind players to navigate the menu independently from the very beginning, without requiring visual assistance. The voice-over/narration system was implemented using multiple specialized objects dedicated to narrative dialogues and the main menu. Figure 2 illustrates an artistic cutscene from the game, featuring narration with Brazilian Portuguese subtitles.

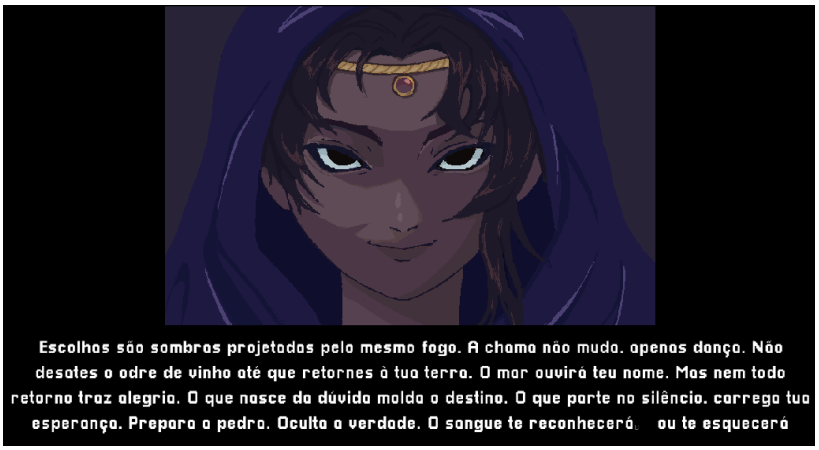

Figure 2. Narrated cutscene system. Source: The authors.

The dialogue boxes feature progressive text rendering (a character-by-character display), automatic suspension of character movement during conversations, and input controls that allow the player to advance the text using the “Enter” key or a mouse click. The game's architecture ensures that only one audio cue is audible at any given time by stopping the previous audio playback before initiating a new one, thereby preventing audio overlap and avoiding confusion for blind players. Figure 3 illustrates the game's dialogue system.

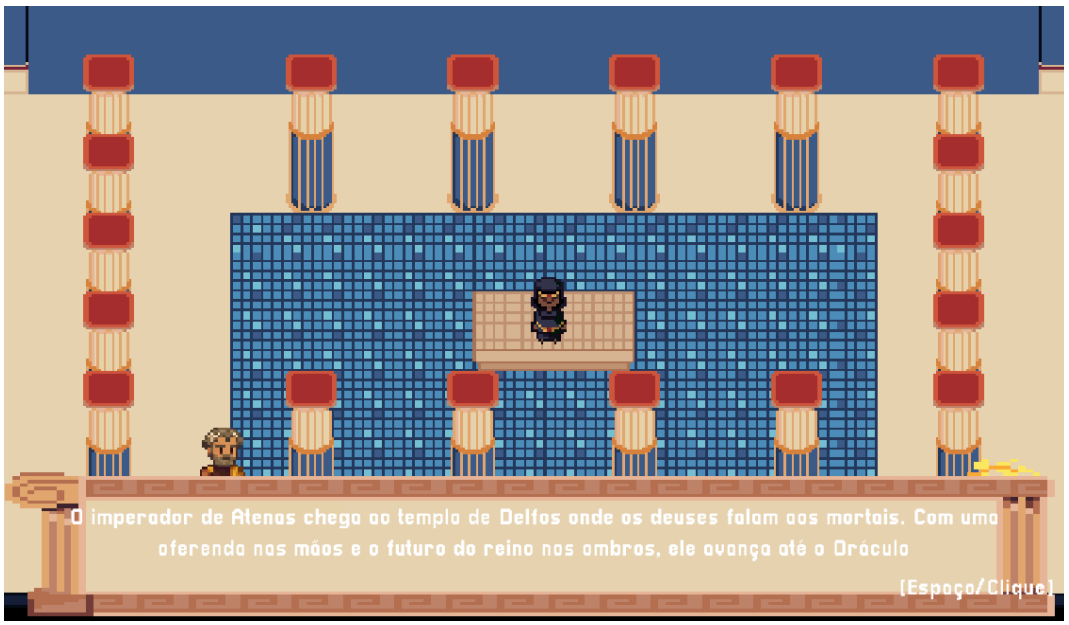

Figure 3. Dialogue system. Source: The authors.

The wall collision system delivers immediate auditory feedback, designed to assist in mentally mapping the environment's boundaries through auditory-tactile exploration. Collisions are detected across four directional axes (top, bottom, left, and right), with a distinct audio cue triggered for each specific direction. Collision detection is calculated predictively, prior to the actual movement execution, ensuring that the sound is played at the exact moment the player attempts to move against a boundary.

5. Conclusion

This work presents the design and audiovisual elements of *Theseus' Odyssey*, demonstrating the technical viability of the accessibility guidelines in action RPGs for totally blind players, adopting stages of the DSR methodology. The primary contribution of this project is providing technical evidence that the inclusion of players without sight does not require the simplification of game mechanics, but rather a competent intersemiotic translation of system feedback into auditory channels, utilizing 3D directional audio and full voice acting as pillars for immersion and navigation.

The contributions, grounded in the guidelines of Soares *et al.* (2024) *apud* Junior *et al*. (2025), allowed the creation of an environment that supports vision-independent exploration and narrative. A crucial aspect of the development is ensuring that accessibility features, especially voice navigation, are available and functional from the game's pre-menu screen. This practice seeks to establish the blind player's autonomy from the outset, standing as an indispensable requirement for inclusive systems.

Despite the positive results, the current version of the game is under continuous improvement and has limitations regarding combat systems and sound customization. These systems will be refined through the implementation of dynamic audio and reactive artificial intelligence over time. Furthermore, future work includes conducting new qualitative empirical evaluations with blind individuals to assess the game's usability and pedagogical potential. In summary, the project points toward a future where ludic complexity and inclusion go hand in hand, reinforcing that accessibility must be a non-functional requirement planned from the game's inception to ensure that playing is a universal experience.

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