

Designing Reusable Alternate Reality Games through Associative Investigation

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Abstract. Alternate Reality Games (ARGs) have been explored as tools for experiential learning and engagement. However, they are often closely tied to specific physical locations, making them difficult to adapt and reuse elsewhere. Existing reusable ARG approaches typically rely on redesigning game rules or remapping narrative elements to new spaces using dedicated software, often requiring specialised technical or design expertise from implementers. This paper proposes an associative investigation framework for designing reusable ARG systems within physical library environments. Rather than rely on fixed puzzle solutions, the framework structures gameplay around investigation topics that can be locally mapped to available resources. Using the design of the library ARG *Project Odyssey* as a case study, this paper describes how this associative investigation approach supports adaptation across differing library spaces while reducing implementation complexity for non-expert implementers such as librarians.

Keywords: Alternate Reality Games, Library Games, Game-based Learning

1 Introduction

Alternate Reality Games (ARGs) have been explored as a method to encourage engagement with unfamiliar environments while supporting experiential learning [1]. An ARG “is a multimodal persistent game played out both in the virtual and real worlds. It uses existing digital systems and technologies such as websites, email and social media, combined with real world spaces and facilities, to construct a mystery narrative that players can slowly unravel and solve” [2]. Traditionally, ARGs are designed for specific physical contexts and fixed locations or objects [3]. While this can make ARGs more effective learning tools [4], it also makes them difficult to reuse across institutions, where physical spaces and available resources vary significantly.

Previous work has explored the development of reusable ARG frameworks, but these approaches often remain dependent on context-specific content or require a level of technical or design expertise from those implementing them. Hajarnis et al. [5] note that supporting an ARG is generally very effort-intensive for its implementers and propose a digital system, WeQuest, that automatically maps the ARG to a new location. WeQuest deals with portability across large areas such as cities, using GPS coordinates through Google Maps [5]. This may still require human intervention if there are unsuitable or incomplete GPS data or if errors occur during the automated mapping process [6]. For ARGs intended for smaller-scale environments, or locations not mapped with Google Maps, this system will not work. Hansen et al. [3] propose

reusability in ARGs by redesigning the game rules for each location. They use the ARG *Humans vs. Zombies* as an example, which relies mainly on emergent player interaction and movement through physical space [7]. However, other ARGs that rely less on physical interactions and more on embedded narrative artefacts, environmental clues, and location-specific puzzles [8, 9] pose different portability challenges.

Prior work demonstrates the effectiveness of ARGs in library contexts. An ARG deployed at Kansas State University [10] and the ARG *Nomad* [4] both require players to locate and use specific call numbers in order to solve narrative puzzles and ciphers, embedding gameplay directly within the organisational structure of a particular library. As a result, transferring these ARGs to another institution would require substantial redesign of both the narrative and gameplay structures. This reflects a broader challenge within ARG design, where games tied to specific geographical locations, layouts, or collections are difficult to adapt without significant re-authoring [6].

This paper proposes *associative investigation* as the central mechanism for creating reusable ARG systems in physical library spaces. By structuring gameplay around an *investigation topic*, rather than fixed solutions, the system supports implementation across diverse physical library locations while remaining accessible to non-expert implementers. The framework is also designed to support replayability, i.e. to be “launched many times without one group of players infringing on another player group’s experience” [3], extended here to include deployment across multiple institutions without requiring design or technical modification.

The associative investigation framework supports the asynchronous deployment of the same ARG across different university libraries, allowing each instance to operate independently while maintaining a consistent underlying structure. In order to achieve this, the game must be easily adaptable to different physical locations.

2 Associative Investigation Framework

A key challenge in designing an ARG that can be deployed effectively across differing physical library spaces is that it cannot rely on fixed objects or exact answers tied to the specifics of those locations. Elements such as book call numbers, collections, and classification systems are localised to each institution, making them unsuitable as fixed components of puzzle design.

Rather than defining fixed puzzle solutions, the associative investigation framework defines an investigation topic that can be locally mapped to available resources. The system defines the type of interaction or reasoning required by the player (e.g., identifying patterns, locating thematic material), while the specific resources used to fulfill these requirements are selected by the implementer within their local context. Players are encouraged to identify *local or culturally specific interpretations* of the topic rather than universally recognised examples. To support meaningful investigation, topics must be sufficiently broad to allow for multiple local interpretations while remaining constrained enough to guide players toward relevant sections of the library. Topics that are overly broad risk becoming discoverable across unrelated collections, while highly specialised topics may limit accessibility and reusability as well as make investigation overly difficult for players and too dependent on specific collections. This abstraction-based design allows for the game to be

adapted across different library environments without requiring substantial redesign of the underlying gameplay structure.

2.1 System Structure

Game-based approaches to information literacy instruction, understood as “formal instruction in the use of library and other information resources” [11], have been associated with increased student engagement, active participation, and experiential learning [12]. The associative investigation framework is structured as a sequence of interactions that guide players through the physical library space while encouraging the practical use of relevant library skills in order to progress. Locating and accessing books is an essential library skill [4], and the game loop has been designed with this at the forefront. The core gameplay loop consists of four stages (see also Fig. 1):

1. **Discovery:** Visual markers (e.g. stickers with game-related icons) direct players toward library areas associated with the investigation topic, ranging from broad collections to specific shelves. Players may interpret the significance of these placements or proceed directly to the materials.
2. **Exploration:** The player must first identify, through self-guided research and reading, relevant books within the indicated section or shelf. Then they must locate relevant information within these books.
3. **Interpretation:** Players compare and synthesise uncovered information to identify connections between materials and local or culturally specific variants of the investigation topic.
4. **Contribution:** Players are encouraged to contribute their findings of local associations through game artefacts such as case files or shared platforms. These contributions extend the game experience and allow for player-driven content generation.

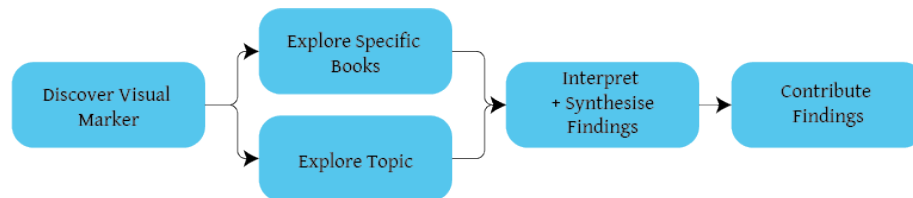


Fig. 1. Visual representation of the Associative Investigation game loop

3 Example Implementation: *Project Odyssey*

This framework was developed through *Project Odyssey*, a cross-institutional library ARG involving the University of Malta (Malta) and the University of Split (Croatia). The project was funded through the SEA-EU Student-Led Projects 2026 scheme. In the case of *Project Odyssey*, the topic of “trickster” was chosen as it provides sufficient breadth to allow flexibility in selection, encompassing materials from areas such as literature, folklore or religion. The game includes a downloadable print-and-play kit

(see Fig. 2) containing a deployment manual and printable visual markers that librarians or other library staff place throughout the library to indicate areas where players may begin their investigation.



Fig. 2. Physical game assets of *Project Odyssey* available as part of the print-and-play kit.

The visual markers function as entry points into the investigation, requiring players to interpret either the meaning of the marker itself or the significance of its placement within the library. Some markers are accompanied by notes or riddles that guide players toward a specific shelf (chosen by the implementer), while others direct players to the blog of the game's protagonist, Wren. Wren is researching local manifestations of the trickster figure. The narrative is structured around Wren's theory that these culturally distinct trickster figures are in fact representations of the same being appearing throughout different regions and historical periods. This narrative structure encourages players to engage in associative investigation by reinterpreting the library space as part of the game world while simultaneously introducing the framework's core investigative mechanics.

For example, a player may discover a marker directing them toward a folklore collection. Using books from that section, they may identify recurring references to trickster figures such as Loki, Anansi, or Reynard the Fox. Players are encouraged to identify cultural or local equivalents, allowing submissions to vary across institutions while preserving the underlying conceptual role of the trickster figure.

Players may send their findings to Wren in the form of case files identifying the local variant. These submissions are preserved on a public website accessible to all players, creating a growing digital archive of trickster interpretations gathered from different university libraries. Over time, this allows the game to accumulate culturally and geographically distinct variants shaped by local collections, histories, and contexts.

4 Discussion

Associative investigation offers a flexible structure for reusable library ARGs by allowing institutions to adapt the framework to their own collections, resources, and expertise. However, the same openness that enables local adaptation also creates challenges in terms of consistency, guidance, evaluation, and control over the player experience. This section discusses these strengths and limitations.

4.1 Strengths

A key strength of this approach is its adaptability across different libraries and low barrier to entry. Rather than requiring implementers to redesign puzzles, remap narratives to new locations, or rewrite game rules, the framework only requires them to identify locally available materials related to the investigation topic and place markers within appropriate areas of the library. This shifts implementation from bespoke game design toward contextual mapping, substantially reducing setup requirements. As librarians already possess expertise in organising and contextualising information within physical library spaces, the framework leverages existing professional competencies rather than requiring specialist ARG design knowledge.

Another strength of the framework is that players contribute their findings as part of the game experience. This also helps address a notable challenge in reusable ARG design: allowing the game to be deployed across multiple locations without players “infringing on another group’s experience” [3]. These findings extend the game content while reflecting the cultural, geographical, and archival context of each library.

Additionally, associative investigation allows implementers to intentionally guide players toward particular collections, subjects, and forms of knowledge within the library by choosing the investigation topic and placing markers. As players search, interpret, compare, and synthesise information from relevant materials rather than retrieve a single fixed answer, the framework is designed to support guided inquiry-based learning, in which learners conduct their own investigation within a structured task [13]. This shifts the interaction away from a traditional scavenger-hunt model toward a more open-ended investigative process shaped by each institution’s resources.

Finally, variability between deployments becomes part of the educational experience rather than a limitation of the system. As players are encouraged to identify locally or culturally relevant interpretations of an investigation topic, different institutions may produce substantially different findings while still operating within the same gameplay structure.

4.2 Limitations

A defining feature of ARGs is that the game designer never has full control over the experience or how players choose to play [9]. By having a less defined system based around investigation topics rather than specific puzzles and their solutions, the implementer may have even less control over gameplay. They guide players toward relevant areas of the library but cannot control which materials players choose to investigate. Additionally, the consistency of the gameplay experience may vary depending on the materials selected. As the system relies on local contextual mapping

rather than fixed puzzle structures, differences in resource selection may significantly influence the difficulty, pacing, and complexity of the experience across deployments.

Furthermore, this framework relies more heavily on player motivation than more structured ARG formats, as players must independently follow clues, interpret materials, and locate relevant resources. Structured onboarding, group formation, progress milestones, and optional hints could help sustain engagement and encourage collaborative puzzle-solving.

The choice of investigation topic heavily influences both the difficulty of the gameplay experience and the practicality of implementation. Topics that are overly broad or abstract may result in players being able to locate relevant materials across large portions of the library, weakening the associative structure of the investigation and reducing the effectiveness of guidance through the space. Conversely, topics that are too narrow or specialised may limit the availability of suitable materials within a given institution, making implementation, reuse, and player progression more difficult. As a result, successful deployment of the framework depends heavily on selecting topics that provide a balance between interpretive flexibility and investigational focus. *Project Odyssey* uses the trickster archetype because its cross-cultural variations support associative investigation across folklore, religion, and literature while keeping the search focused enough to avoid making the entire library relevant. This balance also simplifies implementation, as implementers only need to place markers within a limited number of relevant collections rather than throughout the library as a whole.

It is worth noting that the system has not yet undergone empirical evaluation. Future playtesting of *Project Odyssey*, planned in the next year, may reveal areas requiring refinement or redesign.

5 Conclusion

This paper proposes an associative investigation framework for designing reusable ARGs within physical library environments that encourage players to engage with library and information literacy skills through guided inquiry-based learning. By replacing fixed puzzle solutions with adaptable investigation topics and associative links between materials, the framework enables deployment across differing library spaces without requiring substantial redesign of the underlying game loop. In doing so, the system shifts implementation away from bespoke content creation toward contextual mapping, reducing technical and design barriers for implementers. However, successful deployment remains dependent on careful topic selection, as associative investigation relies on a balance between interpretive flexibility, investigational focus, and the availability of relevant materials within a given institution. While this flexibility introduces trade-offs in authorial control and consistency between deployments, the framework may provide a practical foundation for the broader institutional adoption of ARG-guided inquiry-based learning.

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