

# FAIR Game Design Framework: A Player-Centered Model for Developing and Evaluating Digital Games

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**Abstract**—This paper introduces the FAIR Game Design Framework, a player-centered model that emphasizes Freedom, Autonomy, Immersion, and Replayability. While previous frameworks have addressed isolated aspects of player experience—such as motivation, flow, or usability—a noticeable gap remains in integrating these key dimensions into a single, cohesive model that captures the holistic nature of gameplay. To bridge this gap, we present both the theoretical foundations of the FAIR framework and a practical evaluation tool designed to operationalize its principles in real-world settings. The four pillars of the framework reflect fundamental qualities that contemporary players increasingly value. Freedom highlights the importance of meaningful choices and open-ended possibilities; Autonomy stresses a sense of control and ownership over decisions; Immersion captures the depth of engagement and narrative absorption; and Replayability ensures sustained interest and long-term value. Together, these components create a balanced structure that can guide design decisions across genres and platforms. We demonstrate the framework's versatility through case studies of contemporary games, showing how it can be applied to assess design strengths, identify areas for improvement, and compare player experiences across titles. Ultimately, the FAIR model offers a dual contribution: for developers, it acts as a practical guide to designing richer, more engaging experiences; for researchers, it provides an evaluative metric that enables systematic study of player-centered game design. By uniting theoretical insight with practical application, the framework advances the discourse on what makes games compelling and sustainable.

**Keywords**—Digital Games, Design Framework, Evaluation Framework

## I. INTRODUCTION

The design of digital games has increasingly shifted toward player-centered approaches, emphasizing not only entertainment but also meaningful experiences, engagement, and agency. Contemporary players seek more than predefined rules and linear narratives; they strive for freedom to explore, autonomy in decision-making, immersive environments fostering emotional connection, and replayability that extends the longevity of their experience [1] [2] [3]. This shift underscores the need for structured models that systematically capture and support these dimensions.

Existing frameworks in game design—such as the

Mechanics–Dynamics–Aesthetics (MDA) framework—have significantly advanced our understanding of how games function and evoke enjoyment [4]. However, many of these models focus either on mechanical structures or generalized emotional outcomes, often overlooking the nuanced interplay between player agency, deep immersion, freedom, and long-term engagement [5] [6].

Studies on player agency and replayability highlight the importance of meaningful choice: when player decisions significantly affect the narrative or game state, they experience deeper flow and enhanced replay value [2]. Replayability itself is considered a key factor for sustained engagement, especially in games offering alternate endings, dynamic environments, or multiple ways to complete challenges [7] [8].

Immersion, defined as the player's sense of being "inside" the game world, is foundational for engagement and is enabled by minimizing distractions and fostering the so-called "magic circle" of play [7] [9]. Multimodal sensory stimuli—visual, auditory, haptic—further enhance immersion by engaging cognitive and emotional processes [9].

Non-linear or open-ended narrative structures, which empower players with freedom of choice and exploration, further enrich engagement and immersion. Games such as *The Witcher 3* and *Life Is Strange* exemplify how branching storylines driven by player choices facilitate both agency and replayability [10] [11]. Additionally, design approaches that emphasize player freedom and open-ended play mechanics contribute significantly to long-term engagement and creativity [3].

Despite these important contributions, there remains a gap: no existing framework unifies Freedom, Autonomy, Immersion, and Replayability into a cohesive, evaluable model grounded in both theory and practical application. To address this gap, we introduce the FAIR Game Design Framework. FAIR organizes player experiences around these four pillars:

- Freedom: Non-linear progression, multiple pathways, choice-driven exploration [10].
- Autonomy: Greater control over character and actions; agency within the game world [1] [5].

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- Immersion: Cohesive sensory, narrative, and emotional integration [6] [9].
- Replayability: Diverse solutions and outcomes encouraging repeat engagement [2] [8].

Although the FAIR framework is especially suited to player-driven and exploratory games, it can also be applied to competitive and multiplayer games, where freedom, autonomy, immersion, and replayability still play an important role in shaping the player experience.

This paper first establishes the theoretical foundations of the FAIR framework by grounding it in existing literature. We then present a structured evaluation tool for assessing games along these four dimensions. Finally, we demonstrate the framework's applicability through case studies of contemporary games, showcasing its potential as both a design guide and evaluative metric.

## II. THEORETICAL BACKGROUND AND RELATED WORK

The study of player experience in game design has been informed by multiple theoretical frameworks over the past two decades. One of the most influential is the Mechanics–Dynamics–Aesthetics (MDA) framework, which conceptualizes games as systems where rules (mechanics) generate emergent behavior (dynamics), ultimately shaping the player's emotional responses (aesthetics) [4]. While MDA remains a foundational model for understanding how design choices impact experience, it focuses primarily on the relationship between rules and player emotions rather than on player agency or long-term engagement.

Other approaches have explored player immersion, a central component of engagement in games. Reference [12] describes immersion as a layered process, progressing from engagement to engrossment and finally to total immersion. They argue that cognitive and emotional investment, combined with consistent sensory input, are essential for players to feel "present" within the game world. Similarly, reference [13] proposes the SCI model, which distinguishes between sensory immersion, challenge-based immersion, and imaginative immersion. These models highlight the multifaceted nature of immersion but do not fully integrate its relationship with freedom of choice or replayability.

The notion of player agency has also been a subject of increasing interest. Reference [14] first introduced agency in interactive media as the satisfying power to take meaningful action and see the results of those decisions. Later work in game studies has further emphasized the role of branching narratives and open-world mechanics in enhancing agency [15]. Research suggests that when players are given meaningful autonomy, they perceive games as more rewarding and are more likely to replay them (Sicart, 2008). Additionally, the concept of locus of control, which refers to the degree to which individuals believe they have control over the outcome of events in their lives, has been applied to game design to enhance player agency and immersion [16].

Replayability itself has been studied in terms of design strategies that encourage repeated playthroughs. Reference [17] argues that replay value is tied not only to mechanical depth but also to narrative multiplicity and challenge variation. Games that allow for alternative solutions,

emergent playstyles, or multiple endings are shown to sustain engagement over extended periods.

Taken together, these theoretical perspectives provide valuable insights into isolated dimensions of game design: mechanics and aesthetics (MDA), immersion [12] [13], agency [14] [18], and replayability [17]. However, there remains a gap in integrating these dimensions into a unified framework that can both guide design and evaluate existing games.

The FAIR Game Design Framework addresses this gap by synthesizing these research strands into four interdependent pillars—Freedom, Autonomy, Immersion, and Replayability. FAIR differs from prior models in its explicit focus on player-centered, non-linear, and non-competitive experiences, making it a versatile tool for designers, researchers, and educators seeking to optimize player engagement.

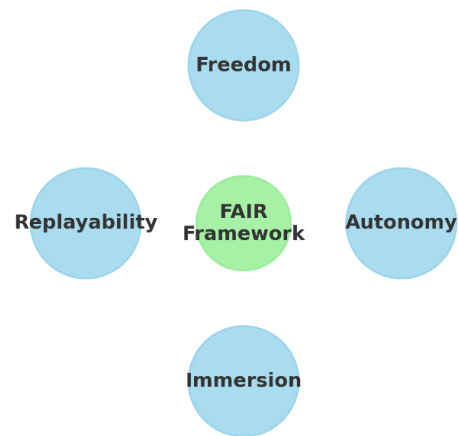


Fig. 1. The FAIR Game Design Framework

## III. THE FAIR GAME DESIGN FRAMEWORK

The FAIR Game Design Framework synthesizes insights from existing theories of player experience into a unified model structured around four interdependent pillars: Freedom, Autonomy, Immersion, and Replayability. Each pillar represents a core dimension of optimal player experience, while their interaction defines the holistic design space.

### A. Freedom

Freedom refers to the player's ability to make meaningful choices about progression, actions, and outcomes. Unlike linear games where paths are predetermined, freedom emphasizes non-linearity and branching structures. This includes:

- Narrative freedom: multiple storylines and alternative endings.
- Spatial freedom: open-world exploration and multiple routes to objectives.
- Challenge freedom: the ability to select which challenges to attempt or avoid.

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### B. *Autonomy*

Autonomy extends the concept of freedom by granting players control and agency within the game system. While freedom emphasizes available options, autonomy focuses on the meaningfulness of those options.

- Character control: fine-grained control over avatars and abilities.
- Decision-making power: choices that significantly alter game states.
- Personalization: ability to shape strategies, playstyles, or game environments.

Autonomy reinforces intrinsic motivation by giving players a sense of ownership over their play experience [5].

### C. *Immersion*

Immersion captures the psychological state in which players feel fully absorbed in the game world. It is facilitated by the integration of sensory, narrative, and emotional elements.

- Sensory immersion: audiovisual fidelity, haptic feedback, and consistent aesthetics [13].
- Narrative immersion: story depth, character development, and role identification.
- Emotional immersion: the ability to elicit empathy, tension, or joy.

Immersion is essential for sustaining engagement, as it fosters the perception of being "inside" the game [12].

### D. *Replayability*

Replayability refers to the degree to which a game sustains engagement across multiple playthroughs. It ensures that player experiences remain fresh and varied, encouraging long-term investment.

- Multiple outcomes: branching storylines and alternate endings.
- Emergent gameplay: mechanics that allow novel strategies or discoveries.
- Challenge variability: dynamic difficulty or procedural content generation.

Replayability extends the lifespan of games and motivates players to return, often discovering new aspects with each session [17].

While each pillar contributes uniquely to player experience, their integration produces a holistic framework:

- Freedom and Autonomy ensure agency and meaningful decision-making.
- Immersion transforms choices into emotionally significant experiences.
- Replayability sustains engagement over time by offering variety and renewal.

Together, the FAIR framework provides both a design guide for game developers and an evaluation tool for

researchers, highlighting strengths and weaknesses in how games deliver player-centered experiences.

While Freedom and Autonomy are closely related, they represent analytically distinct dimensions within the FAIR framework. Freedom refers to the availability of options within the game system (e.g., branching paths, open environments), whereas Autonomy is about the player's capacity to meaningfully act upon those options and influence outcomes. A game may therefore exhibit high freedom but limited autonomy if player choices lack meaningful consequences. This distinction enables FAIR to capture both structural openness and experiential agency as complementary aspects of player-centered design.

## IV. METHODOLOGY

The development of the FAIR Game Design Framework followed a multi-step methodological approach that combined theoretical synthesis, conceptual modeling, and practical validation through case studies.

### A. *Literature Review and Theoretical Synthesis*

The first step in developing the FAIR framework involved conducting a comprehensive review of existing literature on game design and player experience, drawing from both theoretical and empirical sources. Foundational models such as the Mechanics–Dynamics–Aesthetics (MDA) framework [4] provided a structural lens for understanding how design elements translate into patterns of play and affective responses. Complementary perspectives on immersion—including [12] tiered model and [13] concept of the "imaginative, sensory, and challenge-based" components of immersion—underscored the importance of multidimensional engagement in shaping meaningful play experiences.

At the same time, theories of player motivation and agency drawn from self-determination theory (SDT) [5] highlighted autonomy, competence, and relatedness as key psychological drivers of sustained engagement, with autonomy particularly resonating as a core player need in interactive media. Finally, literature on replayability [17] [19] emphasized the role of systemic openness, variability, and challenge structures in extending the longevity and depth of gameplay.

Across this body of work, four dimensions repeatedly emerged as central to high-quality player experience, though they were often treated in fragmented or domain-specific ways:

- Freedom, reflecting the openness of worlds and possibilities for exploration;
- Autonomy, emphasizing player control, agency, and decision-making;
- Immersion, capturing both sensory fidelity and psychological absorption; and
- Replayability, linked to variability, adaptability, and sustained engagement.

The FAIR framework was developed by integrating these four dimensions into a unified model, offering both a conceptual synthesis and a practical tool for evaluation.

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Unlike prior approaches, which often emphasized one or two aspects in isolation (e.g., immersion without replayability, autonomy without systemic freedom), FAIR positions these dimensions as interdependent pillars of player-centered design. This integration not only consolidates fragmented insights but also establishes a flexible evaluative lens capable of guiding both academic research and applied design practice.

### B. Framework Construction

Building upon the synthesis of the literature review, the FAIR framework was developed as a conceptual model organized around four interdependent pillars: Freedom, Autonomy, Immersion, and Replayability. The objective was not only to capture recurring dimensions of player experience but also to render them operationally meaningful for both researchers and designers.

Each pillar was translated into a set of design criteria that represent concrete, observable aspects of game design:

- Freedom was defined through features such as narrative branching, non-linear progression structures, and player-driven challenge selection, enabling players to pursue diverse paths rather than being constrained to a singular trajectory.
- Autonomy was operationalized in terms of control over character actions, the presence of meaningful decision-making opportunities with consequences, and the capacity for personalization or customization that reinforces player agency.
- Immersion encompassed sensory coherence across audiovisual design, narrative depth supporting world-building, and emotional engagement through character relationships and environmental storytelling.
- Replayability was captured through the presence of multiple solutions to challenges, emergent gameplay systems that adapt to player behavior, and diverse outcomes that encourage repeated playthroughs.

The development of the FAIR framework was an iterative process that balanced theoretical alignment with practical applicability. The four pillars—Freedom, Autonomy, Immersion, and Replayability—were cross-referenced with established models such as the Mechanics–Dynamics–Aesthetics (MDA) framework [4], Self-Determination Theory (SDT) in games [5], and studies on replayability [17] to ensure conceptual grounding. From a practical standpoint, the dimensions were tested against representative case studies (e.g., *Minecraft*, *The Legend of Zelda: Breath of the Wild*) to verify whether the criteria could be consistently identified, described, and measured across different genres. This dual approach aligns with the principles of iterative design, which emphasizes cycles of prototyping, testing, and refinement to enhance usability and engagement [20]. For instance, the P-III framework advocates for player-centered, iterative, interdisciplinary, and integrated design processes, highlighting the importance of continuous refinement based on player feedback [21].

A key challenge in constructing the framework was to strike a balance between conceptual abstraction (capturing

the broad idea of each pillar) and practical measurability (translating the idea into concrete, observable design features). The iterative refinement process ensured that FAIR avoided the pitfalls of being either too theoretically vague to guide design or too mechanistically narrow to account for player experience diversity.

The result is a framework that is at once holistic and operational, bridging theory and practice. By embedding design criteria into each pillar, FAIR supports both qualitative assessments (e.g., interviews, expert reviews) and quantitative applications (e.g., checklists, scoring rubrics, or analytics-based evaluations). This dual flexibility makes the framework adaptable across research, design, and evaluation contexts, while maintaining conceptual integrity.

### C. Evaluation Tool Development

To translate the FAIR conceptual model into a practical and actionable instrument, we developed the FAIR Game Design Evaluation Framework. The goal was to provide designers, educators, and researchers with a standardized method for assessing player-centered design features while maintaining flexibility across genres and platforms.

Each of the four pillars—Freedom, Autonomy, Immersion, and Replayability—is evaluated on a 0–5 ordinal scale, where 0 indicates an absence of the pillar in the game design, and 5 denotes exemplary or full integration. The ordinal scoring system allows evaluators to capture gradations in design quality and player experience, reflecting not just presence or absence but the depth, consistency, and effectiveness of each pillar.

To promote consistency and reduce subjective variability, the evaluation tool includes a set of guiding questions for each pillar. These questions operationalize the criteria defined in the framework, prompting evaluators to consider specific, observable features such as:

- Freedom: Are there branching narratives, multiple pathways, or optional challenges?
- Autonomy: Can players meaningfully influence outcomes or customize characters?
- Immersion: Does the game provide coherent sensory experiences, narrative depth, and emotionally engaging environments?
- Replayability: Are there multiple solutions, emergent gameplay systems, or diverse outcomes that encourage repeated play?

By framing the evaluation in this structured way, the tool supports inter-rater reliability, ensuring that multiple evaluators can assess the same game consistently, even across different genres or platforms.

The evaluation sheet was refined through iterative testing on exemplar games, including *Minecraft* [22] and *The Legend of Zelda: Breath of the Wild* [23]. This testing allowed us to calibrate the scale, refine guiding questions for clarity, and ensure that the tool captures subtle differences in how the pillars are implemented. Feedback from multiple evaluators helped identify ambiguities and improve scoring precision, thereby enhancing the tool's practical usability.

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While the tool provides a structured scoring framework, it is not prescriptive. Evaluators are encouraged to contextualize scores within the game's genre, intended audience, and design goals. This flexibility ensures that FAIR can be applied not only to sandbox or open-world games but also to narrative-driven, educational, or experimental game formats. By combining quantitative scoring with qualitative observation, the evaluation tool operationalizes FAIR as a mixed-method instrument, bridging conceptual insights with practical design assessment.

The resulting instrument allows for comparative evaluation across games, highlighting strengths and weaknesses in player-centered design and guiding iterative improvements. It also establishes a foundation for future empirical validation, enabling correlations between FAIR scores and outcomes such as player engagement, satisfaction, or replay behavior.

Although the FAIR scoring system is inherently interpretive, it is not arbitrary. The use of structured guiding questions, combined with multi-rater evaluation and statistical reliability measures (e.g., Cohen's kappa), provides a systematic basis for reducing subjectivity. Rather than eliminating interpretation, FAIR formalizes it, aligning it with established practices in qualitative and mixed-method evaluation frameworks in game studies and HCI.

The 0–5 scale was selected to keep the framework easy to use, while still capturing important differences between the dimensions. Future versions may explore more detailed or weighted scoring systems to improve accuracy in comparisons.

#### D. Case Study Selection and Application

To validate the framework's applicability, we selected contemporary games representing different genres and design philosophies. Case studies included open-world exploration games (*The Legend of Zelda: Breath of the Wild*) and sandbox creativity platforms (*Minecraft*). Each game was evaluated using the FAIR tool by multiple independent reviewers. These genres were intentionally selected because they clearly highlight Freedom and Replayability, making it easier to test the framework at an early stage. Future studies will examine more linear and competitive games to see how well FAIR applies more broadly.

#### E. Analysis and Validation

To assess the robustness and applicability of the FAIR framework, the case study evaluations were subjected to a systematic analysis designed to validate both the framework's structure and its operationalization through the evaluation tool.

The primary objective was to determine the extent to which FAIR could differentiate between distinct design approaches across games. Scores from each of the four pillars were compared to identify patterns in how different genres and design philosophies emphasized Freedom, Autonomy, Immersion, and Replayability. For example, sandbox games such as *Minecraft* were expected to score highly on Freedom and Replayability, while narrative-driven open-world games like *BOTW* were hypothesized to

exhibit stronger Immersion and Freedom within a curated narrative structure. This comparative analysis allowed us to evaluate whether the framework could accurately reflect design intent and player experience priorities.

To ensure the consistency and reliability of the evaluation tool, multiple independent raters scored each game using the FAIR evaluation sheet. Inter-rater reliability was calculated using statistical measures such as Cohen's kappa and intraclass correlation coefficients (ICCs) to quantify agreement among evaluators. High reliability scores confirmed that the guiding questions and operationalized criteria were sufficiently clear to support consistent scoring across different evaluators, reducing the impact of subjective interpretation.

To demonstrate the added value of FAIR, the results were compared with evaluations derived from existing frameworks, including MDA-based analyses [4] and player-centered heuristics from the literature on immersion and motivation [5,6]. While traditional frameworks effectively captured mechanical and aesthetic components of games, they often lacked explicit operationalization of player-centered experience dimensions, such as autonomy or replayability. FAIR's structured focus on these pillars highlighted design features that directly influence meaningful player engagement, providing a complementary perspective that extends beyond mechanics and narrative alone.

The analysis confirmed that FAIR is capable of differentiating games according to their design emphases, providing nuanced insights into how each pillar is implemented and interacted with by players. Moreover, the high inter-rater reliability demonstrates that the framework can be applied consistently across evaluators, supporting its validity as both a research instrument and a practical design tool. Finally, by situating FAIR alongside existing evaluative methods, we show that it not only synthesizes fragmented dimensions of player experience but also adds analytical value by centering evaluation explicitly on player agency, engagement, and experiential quality.

## V. CASE STUDIES: APPLICATION OF THE FAIR FRAMEWORK

### A. Case Study 1: *Minecraft*

*Minecraft* is one of the most influential sandbox games of the last decade, known for its open-ended gameplay and near-infinite creative potential. Unlike traditional goal-oriented games, *Minecraft* emphasizes player-driven exploration, construction, and problem-solving, making it an ideal candidate for applying the FAIR framework (Table 1).

TABLE I. EVALUATING MINECRAFT USING FAIR

FAIR Dimension	Score (0–5)	Justification
Freedom	5	The game offers unparalleled freedom to explore procedurally generated worlds, gather resources, and construct structures without predefined objectives. Players can follow survival challenges or engage purely in creative play.
Autonomy	5	Players have complete control over their avatar's actions, from building and crafting to combat and exploration. Decision-making is highly meaningful, as player choices directly

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		shape the environment and gameplay experience.
<b>Immersion</b>	4	While Minecraft's graphics are stylized rather than realistic, immersion emerges through emergent storytelling, player-driven objectives, and the sense of being embedded in a living world. The game fosters strong emotional engagement, particularly in survival mode.
<b>Replayability</b>	5	Procedural world generation, endless construction possibilities, and modding support ensure infinite replay value. Every new world offers a distinct experience, and community-driven content extends longevity even further.

<b>Immersion</b>	4	5	BOTW's atmospheric design, dynamic systems, and narrative depth provide stronger immersion. Minecraft immersion relies on player-driven storytelling.
<b>Replayability</b>	5	4	Minecraft's procedural worlds and modding support ensure almost infinite replayability. BOTW offers multiple playthroughs but finite content limits long-term replay.

## VI. DISCUSSION

The application of the FAIR Game Design Framework to *Minecraft* and *The Legend of Zelda: Breath of the Wild* highlights its utility in evaluating diverse game genres through a unified, player-centered lens.

### B. Case Study 2: The Legend of Zelda – Breath of the Wild

The Legend of Zelda: Breath of the Wild redefined open-world game design by combining exploration, survival mechanics, and nonlinear progression. Its emphasis on player choice, dynamic systems, and environmental interaction makes it a benchmark for modern open-world design (Table 2).

TABLE II. EVALUATING BOTW USING FAIR

FAIR Dimension	Score (0–5)	Justification
<b>Freedom</b>	5	From the beginning, players can explore nearly the entire map and approach objectives in multiple ways. The main story can be tackled in any order, and players may even attempt the final battle immediately after the tutorial.
<b>Autonomy</b>	4	The game allows a high degree of agency in terms of movement, combat, and puzzle-solving. However, character customization and role-shaping are limited compared to sandbox games like Minecraft.
<b>Immersion</b>	5	BOTW is widely acclaimed for its immersive world, blending atmospheric landscapes, dynamic weather, sound design, and physics-based interactions. The integration of narrative and environmental storytelling enhances the player's sense of presence.
<b>Replayability</b>	4	While the open-world design offers multiple playthrough styles, once major quests are completed, replay value relies primarily on player-imposed challenges or exploration. Procedural variation is limited compared to Minecraft.

TABLE III. COMPARATIVE EVALUATION OF MINECRAFT AND BOTW

FAIR Dimension	Minecraft	Zelda: Breath of the Wild	Comparison Notes
<b>Freedom</b>	5	5	Both games offer maximal freedom; Minecraft through creative sandbox play, BOTW through nonlinear quest and exploration options.
<b>Autonomy</b>	5	4	Minecraft provides full control over world manipulation and character actions. BOTW offers high agency but less character customization.

### A. Insights from Case Studies

The comparative case studies of *Minecraft* and *The Legend of Zelda: Breath of the Wild (BOTW)* provide concrete illustrations of how the FAIR pillars manifest in practice, as well as how different design philosophies produce distinct yet equally compelling player experiences.

Both *Minecraft* and *BOTW* demonstrate that high degrees of freedom and autonomy significantly enhance player engagement, but they operationalize these dimensions differently. In *Minecraft*, freedom is nearly absolute: players can manipulate the environment, craft tools, and define their own goals, effectively constructing personal narratives within an open-ended sandbox. Autonomy is maximized through the absence of prescriptive quests, with players determining pace, direction, and objectives. By contrast, *BOTW* provides freedom within a narrative scaffold. While the game allows nonlinear quest progression and diverse approaches to problem-solving, its design still situates players within an overarching narrative arc and a set of implicit goals. This illustrates a design tension: *Minecraft* prioritizes open-ended authorship, while *BOTW* balances player agency with curated narrative experiences. Both models succeed, highlighting that freedom and autonomy need not always mean total openness but can be flexibly adapted to genre and design intent.

Immersion emerges differently across the two titles. *BOTW* excels through sensory fidelity and environmental coherence, employing a richly detailed audiovisual world, physics-based interactions, and subtle environmental storytelling to draw players into its narrative and landscape. This reflects an *aesthetic immersion* rooted in realism and verisimilitude. Conversely, *Minecraft* relies less on graphical realism and more on *systemic immersion*. Its block-based world, while abstract, supports emergent play, collaborative construction, and creative problem-solving that generate deep personal investment. The game's capacity to foster *narrative immersion through self-authored stories*—building a city, surviving the night, or embarking on cooperative projects—demonstrates that immersion is not dependent on realism but on the depth of player engagement with the game's affordances. The juxtaposition highlights that immersion is a multi-modal phenomenon: it can be achieved through sensory fidelity or through systemic openness to player expression.

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Replayability further distinguishes the two titles. *Minecraft* achieves near-limitless replayability through procedural generation, community-driven modding, and player-authored challenges, creating an effectively infinite variety of experiences. This positions it as a paradigmatic example of *open replayability*, where systemic design invites endless return. *BOTW*, while more finite in its authored quest content, still sustains engagement through its vast explorable world, physics-driven experimentation, and the rise of self-imposed challenges (e.g., speedruns, minimal-equipment runs). This represents a model of *bounded replayability*, where longevity is extended not by infinite content but by the richness of systems that invite reinterpretation. The comparison demonstrates that replayability can emerge from either infinite procedural variation or depth of systemic design, both aligning with FAIR's emphasis on sustaining long-term player engagement.

Taken together, these case studies underscore the flexibility of the FAIR framework. *Minecraft* exemplifies a design philosophy that maximizes Autonomy and Replayability through openness and player authorship, while *BOTW* balances Freedom and Immersion within a curated yet expansive narrative world. Both approaches validate FAIR's central claim: that high-quality player experience is multidimensional, and different emphases on its pillars can produce equally successful but qualitatively distinct play experiences.

### B. Implications for Game Design

The FAIR framework underscores that high-quality player experience is not reducible to a single design principle but emerges from the interaction of multiple, interdependent dimensions. By articulating freedom, autonomy, immersion, and replayability as distinct yet complementary pillars, FAIR provides designers with a flexible evaluative lens that can be adapted across genres, platforms, and target audiences.

Different game genres afford distinct opportunities for leveraging the FAIR pillars. Sandbox and simulation games (e.g., *Minecraft*, *The Sims*) thrive when Autonomy and Replayability are emphasized—allowing players to experiment with mechanics, generate emergent narratives, and return to the game with fresh strategies. Story-driven open-world titles (e.g., *The Witcher 3*, *Red Dead Redemption 2*) benefit most from carefully balancing Immersion and Freedom, enabling players to inhabit richly detailed worlds while also pursuing branching quests and varied exploration paths. Competitive esports titles, by contrast, might lean more heavily on Replayability through balance and depth of mechanics, while still embedding elements of Immersion to sustain long-term engagement.

A central strength of FAIR is that it is not prescriptive; it does not impose a uniform model of "good" game design. Instead, it equips designers with a diagnostic framework to identify which pillars are most critical to their design goals and where trade-offs might occur. For example, maximizing Freedom through non-linear exploration may come at the expense of tightly authored narrative arcs, requiring careful calibration to avoid diluting player engagement. Similarly, designing for strong Immersion in VR contexts may limit

Autonomy if technical constraints restrict player input options. By framing these tensions explicitly, FAIR helps designers make intentional choices about which dimensions to prioritize given the genre, audience, and purpose of their game.

Beyond genre alignment, FAIR offers concrete design insights. Emphasizing Freedom may encourage modular quest design and branching storylines; enhancing Autonomy may involve customization systems, meaningful choice architectures, or adaptive AI; strengthening Immersion may be supported by cohesive art direction, spatial audio, and diegetic UI; while fostering Replayability may be achieved through procedural content generation, multiple endings, or skill-based mastery loops. Rather than prescribing "best practices," FAIR functions as a reflective toolkit, enabling designers to assess whether their intended player experiences are being systematically supported by their design choices.

Ultimately, FAIR situates design practice within a player-centered paradigm. By highlighting the multidimensionality of player experience, it encourages developers to move beyond narrow metrics of success such as graphical fidelity or playtime, and instead evaluate how effectively their games empower players to explore, decide, immerse, and return. In doing so, FAIR bridges design creativity with structured evaluation, offering both inspiration and accountability in the pursuit of richer player experiences.

### C. Limitations

Although the FAIR framework introduces clear guiding questions and structured dimensions for evaluation, the process of assigning scores inevitably involves an element of subjectivity. Different evaluators may interpret the same game features in slightly different ways, particularly when assessing complex constructs such as immersion or autonomy. While inter-rater reliability procedures (e.g., Cohen's kappa or intraclass correlation) can be employed to mitigate these discrepancies and strengthen the robustness of evaluations, they cannot fully eliminate interpretive variability. This limitation suggests that FAIR should be applied in contexts where qualitative interpretation is explicitly acknowledged, and ideally complemented by multiple evaluators to ensure a more balanced assessment.

The current study applies the FAIR framework exclusively to digital games, specifically within the sandbox and open-world genres. While this provides strong evidence of its relevance in contemporary digital play, it also narrows the scope of validation. Other domains such as tabletop games, live-action role-playing, and hybrid analog-digital experiences introduce different affordances, such as shared physical space, negotiated rules, and emergent social dynamics, which may not map directly onto FAIR's four pillars. Similarly, virtual and augmented reality (VR/AR) environments push the boundaries of immersion and agency in ways that may demand additional evaluative criteria, for example spatial embodiment or sensory integration. Educational and serious games also present unique challenges, as their design goals extend beyond entertainment to include learning outcomes, behavioral change, or skill development. Applying FAIR in these

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contexts could help reveal its adaptability and limitations, while also offering opportunities to refine the framework by incorporating domain-specific considerations. Thus, expanding the scope of FAIR across diverse platforms and purposes is not only necessary for validation but also for ensuring its generalizability as a comprehensive evaluative tool in game studies.

At present, FAIR evaluations rely primarily on qualitative scoring and expert interpretation, which, while rich and nuanced, may limit reproducibility and large-scale generalization. Integrating quantitative metrics, such as gameplay telemetry (e.g., exploration patterns, choice diversity) or biometric data (e.g., eye-tracking), could complement this interpretive approach and provide empirical grounding for FAIR dimensions. This integration would enable mixed-method validation and strengthen the framework's predictive potential regarding player engagement and retention. For instance, gameplay telemetry can capture objective behavioral indicators such as frequency of exploration, diversity of chosen paths, or duration of engagement, all of which directly map to FAIR's pillars of freedom, autonomy, and replayability. Physiological or biometric measures, such as eye-tracking or galvanic skin response, could further contribute to evaluating immersion by providing real-time correlates of attention and emotional engagement. By combining qualitative FAIR assessments with data-driven analytics, researchers could establish a mixed-methods approach that grounds subjective evaluation in empirical evidence. This integration would not only enhance the reliability of FAIR assessments but also facilitate longitudinal studies, cross-genre comparisons, and large-scale validation across diverse player populations.

An important limitation of the current FAIR model is its primary focus on the individual player experience. Social interaction, multiplayer dynamics, and community-driven engagement, key elements in many contemporary games, are not explicitly modeled as separate dimensions. However, these aspects can be interpreted as influencing or amplifying existing FAIR pillars, particularly Immersion (through social presence) and Replayability (through emergent social interaction). Future work may explore whether an additional social dimension or an extension layer is required to more fully capture multiplayer experiences.

#### D. Contribution to Game Research

The FAIR framework makes a twofold contribution to the field of game studies and design, advancing both theoretical understanding and practical application.

From a scholarly perspective, FAIR integrates four previously fragmented but widely discussed dimensions of player experience—freedom, autonomy, immersion, and replayability—into a cohesive and systematic model. While each of these constructs has been independently explored in the literature [5, 6, 17], there has been a lack of integrative frameworks that treat them as interdependent rather than isolated factors. FAIR therefore responds to calls within game research for models that move beyond descriptive typologies toward *evaluative systems* capable of linking design features to experiential outcomes. By articulating these dimensions within a unified framework, FAIR

contributes to ongoing theoretical debates about the balance between designer intent and player agency, the role of replayability in sustaining long-term engagement, and the multidimensional nature of immersion.

In addition to its theoretical integration, FAIR offers a structured evaluation tool that can be operationalized by designers, educators, and researchers. For designers, it provides actionable insights into how specific mechanics—such as branching narratives, customizable avatars, or open-world exploration—map onto player-centered values. For educators and serious game developers, FAIR serves as a diagnostic tool to assess whether games not only engage but also empower learners through choice and sustained replayability. For researchers, the framework creates a common vocabulary and set of metrics for comparing games across genres and platforms, fostering more consistent and cumulative empirical work.

Perhaps most importantly, FAIR explicitly links design features to player experience outcomes, thereby bridging the gap between conceptual models and actionable insights. Whereas prior frameworks often remain abstract or prescriptive, FAIR emphasizes evaluation as a *mediating layer* that connects theoretical constructs with design decisions in practice. This dual orientation positions FAIR as both a research contribution and a practical guide, capable of informing academic inquiry while simultaneously shaping industry design practices.

## VII. CONCLUSION & FUTURE WORK

### A. Conclusion

This study introduces the FAIR Game Design Framework, a player-centered model that organizes game design and evaluation around four interdependent pillars: Freedom, Autonomy, Immersion, and Replayability. By synthesizing existing theories of player experience, immersion, and replayability, the framework provides both a conceptual guide for designers and a practical evaluation tool for researchers.

Application of FAIR to two case studies—Minecraft and The Legend of Zelda: Breath of the Wild—demonstrates its versatility across different game genres. Minecraft exemplifies how sandbox mechanics and procedural design can maximize autonomy and replayability, while BOTW illustrates how rich narrative and environmental design enhance freedom and immersion. Together, these examples validate the framework's ability to capture nuanced differences in game design strategies and player experience outcomes.

FAIR emphasizes non-competitive, player-driven experiences, highlighting the importance of meaningful choice, control, and engagement. Its evaluative component allows designers and researchers to systematically assess the extent to which games embody these qualities, thereby supporting informed design decisions and iterative improvement.

### B. Future Work

While the FAIR framework establishes a conceptual and evaluative foundation for player-centered game design, its long-term value will depend on systematic empirical

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validation and methodological expansion. Several directions for future research can strengthen FAIR's theoretical rigor, practical applicability, and technological integration.

Future work should focus on testing the predictive validity of FAIR through large-scale studies with diverse player populations across genres, platforms, and cultural contexts. Survey-based evaluations, combined with longitudinal data on player satisfaction, engagement, and retention, could provide statistical evidence of the relationship between FAIR scores and measurable outcomes of player experience. Such studies would help establish the framework's reliability and generalizability beyond initial case study applications, while also enabling cross-cultural comparisons of core dimensions such as Freedom and Autonomy.

The current study centers on digital games, but FAIR holds promise for evaluating interactive experiences more broadly. Tabletop games could be analyzed in terms of autonomy in rule negotiation and replayability through emergent strategies, while virtual and augmented reality (VR/AR) titles present opportunities for deep immersion and embodied freedom, alongside challenges related to technical constraints. Educational and serious games could particularly benefit from FAIR by aligning gameplay mechanics with learning outcomes, ensuring that player agency and immersion support pedagogical goals. Extending validation to these domains would clarify the framework's adaptability while avoiding redundancy with existing validation efforts.

Future research should also investigate the integration of qualitative FAIR evaluations with objective data sources. In-game behavioral metrics—such as choice patterns, exploration density, navigation behavior, and replay frequency—could complement subjective evaluations to provide a multi-method, data-driven assessment of player experience. Additionally, biometric measures, including eye-tracking and physiological responses, could offer real-time insights into player attention and emotional engagement, strengthening the evaluation of Immersion. This integration would enable more nuanced insights and support the identification of which aspects of the FAIR pillars most strongly predict long-term engagement.

Another promising avenue involves developing software-assisted evaluation platforms that allow designers to score and visualize FAIR dimensions in real time during development. Interactive dashboards could aggregate playtest feedback, telemetry data, and design heuristics into a single FAIR "profile" of a game, supporting data-informed decision-making and iterative refinement. Such tools could make trade-offs between pillars more transparent and help align creative vision with player-centered outcomes.

By addressing these areas, FAIR can mature from a conceptual model into a recognized standard for evaluating interactive experiences. In doing so, it can bridge theory and practice in game design, contributing not only to academic discourse in game studies and HCI but also to industry workflows. A fully validated, widely applied FAIR framework would provide a common vocabulary for researchers, educators, and practitioners alike, advancing the

pursuit of games that are both innovative and deeply responsive to player needs.

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