

Imagined Worlds, Real Learning: Worldbuilding as Pedagogical Design

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Abstract: Game-based learning (GBL) research has largely focused on gameplay mechanics and learning outcomes, often overlooking the fictional worlds within which gameplay occurs. Yet these worlds shape how learners interpret problems, explore alternatives, and construct meaning. This paper proposes collaborative worldbuilding as a pedagogical design approach, arguing that fictional systems can function as environments for inquiry, experimentation, and collective sensemaking. The paper introduces *fictional systems pedagogy*, a framework in which learners co-construct imagined systems encompassing cultures, institutions, and environments. Through this process, learners engage in systems thinking, critical reflection, and creative problem-solving within a context that balances structural complexity with imaginative flexibility. Central to this approach is the concept of *productive fictional distance*, whereby imagined settings provide separation from real-world constraints while retaining meaningful parallels. Drawing on illustrative examples, the paper demonstrates how fictional systems can scaffold engagement with complex issues such as sustainability and governance. It concludes by positioning worldbuilding as a flexible and accessible approach to educational design that expands GBL beyond interaction with predefined systems toward the collaborative construction of learning environments themselves.

Keywords: Game-based learning, Worldbuilding, Constructionism, Microworlds, Speculative futures, Systems thinking

1. Introduction

Game-based learning (GBL) has become a prominent approach in contemporary education, valued for its capacity to engage learners and support experiential forms of knowledge construction. Research highlights its potential to enhance motivation, deepen learning, and foster transferable skills such as problem-solving and collaboration (Foreman, 2004; Plass et al., 2020; Tobias et al., 2014). However, much of this work prioritises gameplay mechanics, assessment outcomes, and behavioural engagement, often treating fictional and narrative elements as secondary.

This reflects a broader instrumental tendency in GBL research, where games are understood primarily as systems of rules and feedback designed to produce measurable effects (Tekinbaş and Zimmerman, 2003). While such approaches are valuable, they can overlook a central feature of many game experiences: the fictional worlds in which gameplay unfolds. From speculative futures to imagined societies, these worlds shape how participants interpret problems and explore alternatives (Bernard et al., 2024; Fine, 1981).

Emerging work in game studies, speculative design, and narrative theory suggests that fictional environments can function as cognitive and epistemic spaces. Speculative frameworks situate complex problems within imagined systems that retain structural relationships while loosening real-world constraints (Fischer and Mehnert, 2021; Gorgel Pinto et al., 2026). Research on collaborative storytelling likewise highlights co-creation as a process of meaning-making (Acharya and Wardrip-Fruin, 2019; Wiczerzycki and Deszczyński, 2022). Yet the pedagogical potential of constructing the worlds that underpin such activities remains under-theorised within GBL.

This paper addresses this gap by proposing collaborative worldbuilding as a pedagogical design approach. Worldbuilding involves the creation of coherent fictional systems encompassing cultures, institutions, environments, and their relationships. In educational contexts, it shifts attention from interaction within predefined systems towards the co-construction of the conditions of inquiry.

The paper introduces *fictional systems pedagogy* as a conceptual framework for understanding this process. It identifies five learning affordances arising from the intersection of system construction, narrative and speculative engagement, and collaborative practice, and translates these into five design principles. The framework is then illustrated through three author-constructed scenarios spanning tabletop role-playing, classroom worldbuilding, and speculative design. These cases are illustrative rather than empirical; their purpose is to demonstrate how the framework might be enacted and to identify questions for subsequent research.

2. Literature Review

2.1 Game-based Learning Beyond Mechanics

GBL research has extensively examined how mechanics such as feedback and goal structures support engagement and learning outcomes (Gee, 2013; Plass et al., 2020). Games are commonly conceptualised as designed systems guiding behaviour through structured challenges (Wei and Zhao, 2024).

While productive, this focus can reinforce a tendency to treat games as tools for delivering content or eliciting behaviours, with effectiveness evaluated primarily through outcomes (Deterding et al., 2011). More recent work emphasises gameplay as interpretive and situated (Gee, 2013; Steinkuehler et al., 2012), yet fictional worlds remain comparatively underexamined. Narrative and setting may be acknowledged as supporting immersion without being treated as central components of learning design.

Learning is not simply a product of interaction with rule systems, but also emerges through meaning-making shaped by context, representation, and interpretation (Daniela and Lytras, 2018; Steinkuehler et al., 2012). Educators and designers must therefore consider not only how games function as systems, but how they are experienced as situated, culturally embedded practices (Durga and Squire, 2011; Shapiro and Squire, 2011). This creates a basis for considering the fictional systems surrounding and constituting gameplay as potentially pedagogically significant.

2.2 Narrative, Fiction, and Speculation in Learning

Beyond GBL, a growing body of work has explored narrative and fiction in relation to learning, reflection, and critical inquiry. Narrative is a fundamental mode of human sensemaking, structuring how individuals organise experience, interpret events, and imagine alternatives (Bruner, 1991; Freeman, 2015; Wyne, 2025). In educational contexts, narrative frameworks can provide coherence, emotional engagement, and ways of situating abstract concepts within meaningful contexts (Moore, 2009; Norris et al., 2005).

Fiction can also create opportunities to examine complex issues at a remove from immediate real-world constraints. This is evident in speculative design and futures studies, where imagined scenarios are used to interrogate systems and envision alternatives (Bernard-Rau, 2024; Dunne and Raby, 2024; Fischer and Mehnert, 2021). Speculative approaches are particularly relevant to “wicked problems”, enabling exploration of interdependent systems through constructed scenarios (Candy and Dunagan, 2017; Lönngren and Van Poeck, 2021).

Participatory forms such as role-playing further emphasise co-creation, positioning participants as contributors to narrative and world construction (Fine, 1981; Van Doorn and De Vries, 2006; Winardy et al., 2024). However, while narrative and speculation have been explored as pedagogical tools, less attention has been given to the structured creation of the interconnected worlds that underpin these activities, particularly within GBL.

2.3 Constructionism, Co-creation, and Participatory Learning

Constructionist approaches emphasise learning through making and designing (Harel and Papert, 1993; Kafai and Burke, 2015). In GBL, this may involve learners creating games or other artefacts, while participatory design and co-creation emphasise collaborative knowledge production (Björgvinsson et al., 2012). Collective storytelling similarly foregrounds shared meaning-making through interaction (Wieczerzycki and Deszczyński, 2022).

These approaches, however, often focus on discrete outputs. Less attention has been given to the creation of interconnected systems that evolve through continued contribution and revision. Worldbuilding extends constructionist learning into this systemic domain, integrating narrative, speculation, and design into a process in which the object being constructed is itself a dynamic environment for inquiry.

2.4 Conceptual Synthesis

These intellectual strands, informed by systems-oriented approaches to complex problems, contributed to developing the proposed framework via an integrative, non-systematic synthesis of literature. Sources were selected for their direct relevance to how learners construct, interpret, negotiate, and modify represented systems rather than to provide an exhaustive review of any single field. The literature was read comparatively to identify recurring pedagogical processes and consolidate substantively similar affordances across domains.

This process yielded five key affordances: systems thinking, critical reflection, creative problem-solving, productive fictional distance, and collective sensemaking. The proposed framework is therefore a conceptual synthesis rather than a systematic review or empirical validation of these affordances.

3. Conceptual Framework: Fictional Systems Pedagogy

This section develops *fictional systems pedagogy* as a framework for understanding how collaboratively constructed worlds can function as environments for learning. Rather than treating fiction as a narrative layer applied to gameplay, the approach positions fictional systems as structures through which inquiry, experimentation, and meaning-making can take place.

3.1 Defining Fictional Systems

A fictional system is a coherent imagined world composed of interrelated elements such as cultures, institutions, technologies, and environments. These elements interact dynamically, shaping constraints and possibilities.

Unlike narrative, which focuses primarily on events and their representation, fictional systems operate at the level of relationships and structures. They are also distinct from simulations: although both can represent relationships and dynamics, fictional systems permit greater abstraction and reconfiguration without requiring fidelity to an existing real-world system (Noss and Hoyles, 2017). Their value for learning therefore lies not simply in representing a system, but in making its conditions available for collaborative construction and revision.

3.2 Worldbuilding as Pedagogical Design

Worldbuilding is the collaborative construction of fictional systems. Unlike predefined learning environments, it positions learners as designers of the conditions of inquiry (Acharya and Wardrip-Fruin, 2019; Fischer and Mehnert, 2021). This requires learners to externalise assumptions, articulate reasoning, negotiate meanings, and consider systemic consequences. Worldbuilding thus aligns with constructionist principles while extending them beyond discrete artefacts to dynamic systems.

Worldbuilding is not inherently game-based. Here it is positioned as a related participatory design practice that can operate before, within, or alongside GBL. It may constitute the design space in which a game subsequently occurs, become part of gameplay itself, or function as a stand-alone learning activity using game-like structures. The framework therefore identifies a pedagogical affordance that can extend GBL rather than defining worldbuilding as a game.

3.3 Core Learning Affordances of Fictional Systems

The literature synthesis identifies five recurring learning affordances at the intersection of system construction, narrative and speculative engagement, and collaborative practice. Systems-oriented learning informs systems thinking; narrative and speculative approaches foreground critical reflection and alternative possibilities; constructionist and design approaches contribute creative problem-solving through iteration; research on fiction and role-play suggests potential for fictional distance; and co-creation and collective storytelling foreground collective sensemaking. These affordances are analytically distinct but mutually reinforcing; the framework does not assume that every worldbuilding activity will produce all five.

3.3.1 Systems thinking

Worldbuilding requires learners to consider how different elements interact across multiple levels, such as individual, institutional, and environmental. Designing a fictional world involves anticipating consequences, identifying interdependencies, and responding to changes within the system (Davies, 2010). It may therefore support systems thinking by making abstract relationships concrete, visible, and manipulable.

3.3.2 Critical reflection

Constructing alternative systems can prompt learners to examine assumptions embedded in existing ones. Decisions about governance, resource allocation, technology, or social norms within a fictional world can mirror, challenge, or reconfigure real-world structures, making implicit values available for examination (De Groot, 2018). Designing “otherwise” may create opportunities for critique without requiring immediate agreement about the real-world position being examined.

3.3.3 Creative problem-solving

Fictional systems can expand the range of solutions available for exploration because their conditions can be deliberately modified. Iterative worldbuilding enables participants to prototype ideas, observe possible consequences, and revise their designs rather than treating an initial solution as final (Dunne and Raby, 2024). This may support generative problem-solving in which alternatives are explored before decisions are fixed.

3.3.4 Productive fictional distance

Couching challenges within fictional environments may provide some separation from participants' real-world identities and immediate consequences. Such distance may lower barriers to proposing unconventional ideas or engaging in critique, particularly when topics are complex or sensitive (Abbott et al., 2022; Wisker, 2014). However, fictional distance does not itself establish psychological safety. The conditions of participation remain dependent on facilitation, group dynamics, and participants' circumstances.

Fictional systems also occupy a position between abstraction and realism. They can retain meaningful structural parallels with real-world contexts while permitting reconfiguration. Unlike a purely abstract model, a fictional system can provide contextual richness; unlike a realistic simulation, it need not reproduce existing constraints. This designed ambiguity constitutes *productive fictional distance*: a space in which learners can explore relationships and possibilities without being wholly constrained by the conditions they are examining.

3.3.5 Collective sensemaking

Because fictional worlds are co-constructed, participants must negotiate contributions, reconcile differing perspectives, and maintain sufficient coherence for the system to function (Gjedde, 2013; Lasley, 2024; Scager et al., 2016). Meaning is consequently produced through interaction rather than imposed externally. Worldbuilding may therefore support collective sensemaking by making disagreement, interpretation, and coordination part of the learning activity itself.

Taken together, these affordances describe potential learning processes rather than guaranteed outcomes. Their educational value depends on how activities are designed, facilitated, and connected to explicit opportunities for reflection.

3.4 From Framework to Practice: Design Principles

The five design principles below translate the affordances into actionable orientations for worldbuilding design. They are not prescriptive rules but adaptable principles for structuring activities.

1. Prioritise System Coherence over Narrative Detail

Encourage learners to focus on how elements of the world interact rather than on surface-level storytelling. A coherent system provides a stronger basis for inquiry than an elaborated but disconnected narrative.

2. Scaffold but Do Not Predetermine

Provide initial structures or prompts, such as themes, constraints, or starting conditions, while leaving key aspects of the system open to co-creation. This provides direction without removing learner agency.

3. Design for Iteration

Allow the world to evolve through revision, expansion, and response to emergent dynamics. Iteration makes the consequences of design choices available for further inquiry rather than treating the first version as complete.

4. Integrate Reflection with Construction

Pair worldbuilding with structured opportunities to articulate the reasoning behind design choices and connect fictional elements to relevant real-world concepts. Reflection should be part of construction rather than an entirely separate activity.

5. Embrace Productive Ambiguity

Avoid over-specifying the system. Leaving space for interpretation and negotiation can support diverse contributions and allow participants to explore possibilities that were not predetermined by the facilitator.

4. Illustrative Cases and Applications

The following are author-constructed illustrative scenarios, informed by the literature reviewed above; established practices in tabletop role-playing, classroom worldbuilding, and speculative design; and the author's higher education practice. They are not reports of empirical studies or claims about observed learner outcomes. Their purpose is to show how the proposed framework might be enacted across different educational contexts.

4.1 Tabletop Role-playing and Emergent Systems

Tabletop role-playing provides an established context for collaborative engagement with fictional worlds. Participants may contribute to social structures, environments, and institutional dynamics while simultaneously navigating the consequences of their decisions.

In one illustrative scenario, participants collectively develop a frontier settlement in a resource-scarce environment: a distant space colony. Rather than focusing solely on character-driven narrative, the activity foregrounds systemic questions: How are resources distributed? What forms of governance emerge? How are conflicts resolved? As participants introduce trade systems, social hierarchies, or environmental constraints, the fictional world becomes an evolving system shaped by collective decisions.

A facilitator might then ask: "Who benefits from the settlement's current resource rules, and what changes if the scarce resource disappears?" Groups revise one institutional rule and explain two anticipated consequences. The activity therefore makes systems relationships and competing perspectives part of play, while requiring participants to negotiate a shared fictional environment.

The scenario illustrates potential affordances in systems thinking, collective sensemaking, creative problem-solving, and productive fictional distance. However, the fictional setting should not be assumed to make participation psychologically safe; this remains a matter of facilitation and group dynamics.

4.2 Classroom Worldbuilding for Complex Problem Exploration

Worldbuilding can also be adapted to more structured educational settings, where it provides a framework for exploring complex or interdisciplinary problems. In an illustrative environmental-learning scenario, learners work in small groups to explore a fictional society responding to catastrophic climate instability.

Groups define governance structures, economic systems, cultural norms, and technological adaptations, considering how changes in one domain affect others. For example, prioritising technological solutions may create new inequalities, while alternative governance models may reshape resource distribution. The activity unfolds iteratively, with the facilitator introducing challenges such as population shifts or environmental shocks.

After each intervention, groups revise their system and produce a one-page systems map. They then respond to a reflection question such as: "Which assumptions shaped your response to the disruption, and which elements of your system became harder to change?"

Here, worldbuilding functions as a scaffold for inquiry. The concrete design task makes relationships between domains available for examination while iteration exposes tensions and assumptions within the fictional system.

4.3 Speculative Design and Alternative Futures

A third application lies in speculative design, where constructed worlds can be used to explore alternative futures and interrogate present conditions. Such activities often extrapolate from current social, technological, or environmental trends (Dunne and Raby, 2024).

In an illustrative workshop, participants collaboratively develop a near-future urban environment shaped by emerging technologies and shifting social norms. Rather than producing isolated artefacts, they construct a coherent world in which these elements interact. Participants consider not only what technologies exist, but who governs them, who can access them, and what unintended consequences may follow.

For example, participants might introduce one technology and map who controls it, who can access it, and one unintended consequence 10 years later. They then use the resulting scenario to examine how different actors might respond to a subsequent challenge. The exercise makes interdependencies between technological, social, and institutional factors available for examination.

The speculative setting can also allow participants to project assumptions about the present into an imagined future. Worldbuilding thus operates simultaneously as creative construction and critical inquiry, providing a means of interrogating existing trajectories while imagining alternatives.

5. Discussion

This paper proposes a shift in how GBL can be conceptualised and designed: from a primary focus on interaction within pre-designed systems towards greater attention to the collaborative construction of those systems. In this framing, fictional worlds are not merely narrative embellishments or motivational devices. They can constitute pedagogical infrastructures through which inquiry, experimentation, and meaning-making are organised.

The framework contributes in three ways. First, it expands the locus of learning from gameplay to design. While established GBL approaches often examine how learners interact with predefined mechanics, fictional systems pedagogy foregrounds the epistemic potential of constructing and revising systems themselves. This aligns GBL with constructionist traditions while extending construction into systemic and narrative domains.

Second, fictional systems provide a useful point of comparison with simulation-based learning and case-based teaching. Like simulations, they can represent relationships and dynamics; like case studies, they can provide situated contexts for analysis. Their distinguishing feature is the degree to which learners can participate in constructing and modifying the conditions of inquiry. This openness may be particularly useful when exploring complex or uncertain problems for which a single predefined scenario would constrain the range of possibilities.

Third, the framework identifies design considerations for educators. Worldbuilding can be implemented without necessarily requiring advanced technical infrastructure, and its collaborative structure can be adapted across disciplines and formats. However, these are design possibilities rather than demonstrated benefits. The quality of the learning experience will depend on appropriate scaffolding, facilitation, reflection, and alignment with learning purposes.

The concept of productive fictional distance also requires careful qualification. Fiction may provide useful separation from participants' immediate identities or positions, but fictionalisation does not guarantee psychological safety or equitable participation. Facilitation, group dynamics, accessibility, and participants' circumstances remain consequential. Similarly, open-ended activities can create challenges for assessment when educational contexts require clearly defined outcomes.

These limitations point directly towards an empirical research agenda. Future studies could examine how different forms of worldbuilding affect learning processes, how affordances emerge under different facilitation conditions, and whether particular design choices make some affordances more or less likely. Comparative studies across tabletop, classroom, digital, and speculative-design contexts could also investigate when worldbuilding functions most effectively as a component of GBL and when it is better understood as a related participatory pedagogy.

The framework should therefore be understood as a proposition to investigate, not a validated model of learning outcomes. Its contribution is to provide a vocabulary and set of design principles for examining a dimension of GBL that has received comparatively less attention: what happens when learners do not simply enter a designed world, but participate in making the world itself.

6. Conclusion

This paper has introduced *fictional systems pedagogy* as a conceptual framework for understanding collaborative worldbuilding as a potential site of learning. By shifting attention from interaction within predefined systems towards the co-construction of fictional systems, it identifies five learning affordances: systems thinking, critical reflection, creative problem-solving, productive fictional distance, and collective sensemaking.

The framework positions worldbuilding as a participatory practice that can operate before, within, alongside, or independently of GBL. Its pedagogical value lies not simply in imaginative content, but in the opportunity to construct, negotiate, interrogate, and revise the relationships that constitute a fictional system. Five design principles—system coherence, non-deterministic scaffolding, iteration, integrated reflection, and productive ambiguity—translate these affordances into practical orientations.

The cases presented here are illustrative rather than empirical. Drawing from composite syntheses of real-world practice, they indicate how the framework might be enacted across different contexts, but do not establish particular learning outcomes. The next step is therefore not to assume that fictional systems produce particular effects, but to investigate when, how, and for whom their affordances become educationally productive.

Ethics Declaration: This study does not report on primary empirical research involving human participants. All cases are composite and illustrative, drawing on the author's regular classroom practice. Ethical approval was therefore not required.

AI Declaration: Limited digital tools such as spell-check were used in the preparation of this manuscript to support editing and language refinement. All substantive ideas, arguments, and conceptual contributions are the work of the author.

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