

Arcademia: A Global Game Ecosystem for Learning, Research and Community

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Abstract: Game jams have become widely recognised as effective environments for experiential learning, rapid prototyping, and collaborative creativity within computing and game design education. However, these events are often temporally bounded activities that conclude once the development sprint ends, limiting their potential as a sustained educational and research infrastructure. This paper introduces Arcademia, an international academic initiative that reconceptualises the game jam as a foundational component within a broader ecosystem designed to support teaching and learning, research and community engagement. Arcademia connects educational institutions across continents through a network of collaborative activities, shared infrastructure, and playable artefacts, positioning playful production and legacy archival as an enduring practice rather than a one-off event. Within this ecosystem, the international game jam functions as a mechanism for engagement, a collaborative development sprint where students rapidly ideate, prototype, and deliver playable games in response to a shared theme. Extending beyond this initial activation, the initiative is structured around three interconnected pillars. The first pillar, teaching and learning, frames Arcademia as a pedagogical ecosystem that encourages interdisciplinary collaboration, reflective practice, and authentic problem-solving as students present their outcomes through short pitches to local and regional judges. The second pillar, research, treats the initiative as a living laboratory for the scholarship of teaching and learning, supported by data collection, artefact analysis, and cross-institutional collaboration among educators. The third pillar, community engagement, ensures the persistence of student work by deploying completed games on physical arcade cabinets at participating institutions, establishing a distributed archive that symbolises global academic collaboration. By articulating this conceptual model, this paper contributes to discussions in game-based learning on how playful development environments can be structured as sustainable ecosystems that transcend conventional event-based constraints, thereby strengthening collaboration among institutions, students, researchers, and industry professionals.

Keywords: Authentic learning, Experiential learning, Game jams, Gameful learning, Learning ecosystem

1. Introduction

Over the past two decades, game jams have emerged as a prominent practice within both the game development community and education environments. These time-constrained sprint events challenge participants to conceptualise and develop a playable game prototype within a tightly bounded window, ranging from a few hours to several weeks, though 24-hour and 48-hour formats are by far the most common (Kultima 2015; Lai et al 2021). Educational research indicates that game jams can foster creativity, teamwork, and problem-solving under authentic development constraints, encouraging rapid prototyping and interdisciplinary collaboration that resembles real-world creative production environments (Lassheikki 2019; Aurava et al 2021; Aurava and Sormunen 2023). Beyond technical skill development, they have also been shown to increase motivation, engagement, and peer learning by promoting experimentation, shared ownership of outcomes, and collaborative knowledge construction within time-constrained design contexts (Kultima 2015; Hayes 2022).

Despite multiple recognised benefits, the use of game jams in education presents several structural limitations. A commonly identified characteristic is their temporal boundedness, as most game jams are short-lived events that culminate in a prototype before development stops and the participants disperse (Kultima 2015; Kultima et al 2021). While such a format supports intense creativity and collaboration, it restricts the longer-term pedagogical value of the activity, as many artefacts, insights and learning experiences generated during the event remain underutilised within institutional contexts, with prototypes typically requiring significant further development to become full games (Kultima et al 2021). A further limitation relates to the integration of game jams within formal educational structures, as universities and places of education frequently organise them as isolated extracurricular events or short course activities rather than as sustained learning infrastructures (Meriläinen et al 2020). Consequently, the learning opportunities created by these events often remain disconnected from broader teaching, research, and community engagement goals. In addition, implementations may lack mechanisms for long-term knowledge generation and research integration, even though game jams

provide rich contexts for examining collaborative creativity, design processes, and learning behaviours. Game jams are thus powerful but structurally underutilised in education ecosystems.

In response to this gap, we introduce Arcademia, an international academic initiative, co-developed by researchers and students at the University of Lincoln, North-West University, and a growing network of partner institutions, that reconceptualises the game jam as a foundational component within a broader educational ecosystem. Rather than treating the jam as a standalone event, Arcademia embeds it within a wider structural framework designed to capture and extend the value of the development sprint. Operationally, the initiative connects participating institutions through shared events, digital communication channels, and the deployment of playable game artefacts on physical arcade cabinets, creating a sustained environment in which student creativity, pedagogical experimentation, and scholarship can intersect meaningfully within a globally connected ecosystem.

The contribution of this paper is twofold. First, it proposes a conceptual model for structuring game jam initiatives as sustainable learning ecosystems that extend beyond the time constraints of conventional events. Second, it presents a preliminary implementation case study to demonstrate how such an ecosystem can begin to integrate pedagogical practice, research activity, and social responsiveness within a unified framework. As a conceptual paper, this contribution centres on articulating and grounding the ecosystem model rather than on empirically validating its outcomes; systematic evaluation of the model's impact is identified throughout as a direction for future work. In doing so, we contribute to ongoing discussions within game-based learning research regarding how playful development environments can be designed as long-term educational infrastructures.

Accordingly, the guiding question for this work is: *How can game jam initiatives be structured as sustainable learning ecosystems that extend teaching, research, and community engagement beyond the boundaries of the event itself?*

2. Background and Related Work

The Arcademia model draws on several intersecting bodies of literature, spanning game jams as experiential and authentic learning environments, cross-institutional collaboration in game-based education, and the transition from isolated events to sustained learning ecosystems.

2.1 Game Jams in Education: Experiential Learning by Making

Game jams are potent pedagogical tools, defined as intensive events for rapid, collaborative game creation under predefined constraints (Shin et al 2012; Chatham et al 2013; Meriläinen et al 2020). The educational value of such events is rooted in foundational learning theories, particularly experiential learning, where direct experiences serve as the primary driver of both learning and development (Kolb 1983). Prior research has shown that participation in these events enhances not only technical game development skills but also crucial soft skills such as teamwork, project management, and communication (Fowler et al 2018; Meriläinen et al 2020). This aligns with the principles of constructionism, a paradigm based on constructivism, which posits that learning is most effective when individuals actively build knowledge through hands-on engagement and creation (Petri et al 2015). Game jam sprints embody this approach by establishing and nurturing active and collaborative learning formats (Malin 2024). Studies have explored how such development sprints can be utilised as pedagogical instruments to facilitate skill acquisition by way of making things, framing game jams as an example of learning-by-doing (Petri et al 2015; Yolac 2023). By situating game development within this constructionist framework, game jams provide an environment where students can experience the need for abstract principles like loops or variables while solving tangible problems, rather than learning them in isolation (Petri et al 2015). The iterative nature of designing and building a game within a short timeframe, moreover, fosters creative experimentation, independent thinking, and social knowledge construction (Petri et al 2015).

2.2 Game Jams as Authentic, Project-Based Learning

Building upon their experiential foundation, game jams can be framed as a form of authentic, project-based learning (PjBL). Authentic learning is grounded in social constructivism and engages learners in meaningful, real-world activities where knowledge is constructed by way of solving problems (Jumaat et al 2017; Nona et al 2024). This approach is closely mirrored by PjBL, which translates constructivist theory into hands-on practice (Petri et al 2015; Jumaat et al 2017). Early research into game-based education recognised its potential by drawing from these same constructivist and experiential paradigms (Lainema and Saarinen 2010), with some proposing educational game design frameworks based directly on experiential learning theory (Petri et al 2015; Li and Li 2021). Game jams, as a specific kind of game-based learning, represent authentic constructivist contexts where

students actively build knowledge (Aurava and Meriläinen 2022). These events facilitate interdisciplinary collaboration and foster skills such as problem-solving, critical thinking, and teamwork, which are hallmarks of authentic learning environments (Murray et al 2017; Papageorgiou and Kasimatis 2021). The game jam format functions as a practical application of discipline-specific knowledge while promoting project management and communication skills, providing a tangible experience where participants learn through active, self-directed engagement (Lee 2007).

2.3 From Isolated Events to Sustained Learning Ecosystems

In order to maximise their long-term educational impact, game jams must evolve from isolated events into integral components of sustained learning ecosystems. A learning ecosystem is a conceptual framework that integrates digital tools, pedagogical strategies, and community engagement to support continuous, lifelong learning (Radenkova 2024). Early theoretical models for such ecosystems drew upon social constructivism and ecological theories, emphasising the need for systems thinking in educational design to establish adaptive learning environments (Dekay 1996; Zhang and Maesako 2009). Recent work highlights that the success of these ecosystems depends on collaboration between various stakeholders, including industry, universities, and schools, to facilitate rapid adaptation to changing environments (Barokas and Barth 2018). Universities are viewed as central actors in this model, evolving beyond traditional roles to actively foster community development and support lifelong learning pathways within the ecosystem (Koroleva and Tomasova 2024). For game jams to transcend their status as one-off experiences, they must be situated within this broader institutional infrastructure (Barokas and Barth 2018). This transition requires institutional redesign to bridge the gap between informal, event-based activities and formal, continuous development, thereby transforming jams into catalysts within a thriving ecosystem that promotes adaptability and collaboration (Radenkova 2024).

3. The Arcademia Ecosystem: A Conceptual Model

This research contributes a conceptual and operational model that reconceptualises the game jam from a discrete pedagogical event into a persistent, multi-pillared learning ecosystem. To address the lack of structural persistence identified above, the proposed model introduces a game jam activation mechanism feeding into a three-pillared architecture that enables continuity, scalability, and multi-stakeholder value creation. Each pillar represents a distinct but interdependent domain of activity, collectively forming a system that extends learning, supports research, and embeds outputs within community-facing contexts. Playable games produced during the jam become part of a distributed archive deployed on physical arcade cabinets across participating universities, creating a lasting artefact legacy that symbolises collective creativity and international academic exchange. This contribution is grounded in principles from learning ecosystem theory, experiential learning, and design science research, where artefacts are iteratively developed, evaluated, and rooted within real-world contexts.

3.1 Activation: The Game Jam Event

Preceding the three pillars, the game jam functions as the ecosystem's activation mechanism rather than as a pillar in its own right. In this role, the jam acts as a catalyst for engagement, initiating cycles of creative production, collaboration, and problem-solving. Empirical studies on game-based learning and experiential pedagogy support the use of time-constrained, challenge-based environments to enhance motivation, agency, and skill development. Within the proposed model, the game jam's primary function is to generate momentum and artefacts. Its intensity and constraints are not limitations but design features that promote rapid iteration and decision-making. However, its value is intentionally bounded unless connected to the three pillars that follow; activation is therefore necessary but insufficient on its own, requiring integration with structures that sustain and extend its outcomes.

3.2 Pillar 1: Teaching and Learning Infrastructure

The first pillar is underpinned by principles of heutagogy, which emphasise learner autonomy, self-determined learning, and capability development (Grigoletti 2020). In this model, students are not passive recipients of knowledge but active agents who navigate non-linear and personalised learning pathways. This is particularly pertinent in domains such as computer science and game design, where knowledge is rapidly evolving and the ability to learn, adapt, and reconfigure understanding is more valuable than static content mastery. From a scientific perspective, this pillar addresses the transfer problem, namely the challenges of translating short-term experiential engagement into measurable and sustained academic development. By embedding game jam artefacts into coursework, reflective exercises, and portfolio-based assessment, learning is structured as cumulative rather than episodic. Students are required to critically reflect on their design decisions,

collaboration processes, and technical implementations, thereby reinforcing metacognitive development and deeper learning. Furthermore, the Arcademia environment can be conceptualised as a smart learning ecosystem that integrates both biotic components (students, educators) and abiotic components (hardware, software, and pedagogical structures) to support experiential STEM education (Kummanee et al 2020). This systematic integration enables a holistic learning environment in which knowledge is constructed through interaction, experimentation, and iteration. The result is a pedagogical structure that not only supports varying learning pathways and interdisciplinary collaboration but also provides a scalable and adaptable model for embedding game-based learning within education contexts.

3.3 Pillar 2: Research Infrastructure

The second pillar formalises the research potential of the ecosystem by structuring the collection, analysis, and dissemination of data generated through participation. Game jams produce rich datasets, including behavioural interactions, design artefacts, and reflective outputs, yet these are often underutilised in scholarly work. By embedding research protocols within the ecosystem, this pillar enables systematic investigation into areas such as player experience, collaboration dynamics, learning outcomes, and design processes. The model aligns with design science research, where the ecosystem itself functions as an artefact subject to iterative refinement and evaluation. This transforms the initiative from a teaching intervention into a research-generating infrastructure, contributing to the broader field of game-based learning.

3.4 Pillar 3: Community Engagement and Artefact Persistence

The third pillar ensures that outputs generated within the ecosystem extend beyond academic contexts into public and community spaces. This is achieved through the curation and deployment of selected artefacts, such as playable games hosted on arcade cabinets or digital platforms accessible to broader audiences. The scientific contribution of this pillar lies in its alignment with theories of public scholarship and knowledge mobilisation, which emphasise the importance of making academic outputs visible and impactful beyond institutional boundaries. By preserving and showcasing student work, the model enhances motivation, reinforces the authenticity of the learning experience, and establishes a feedback loop between academia and the community.

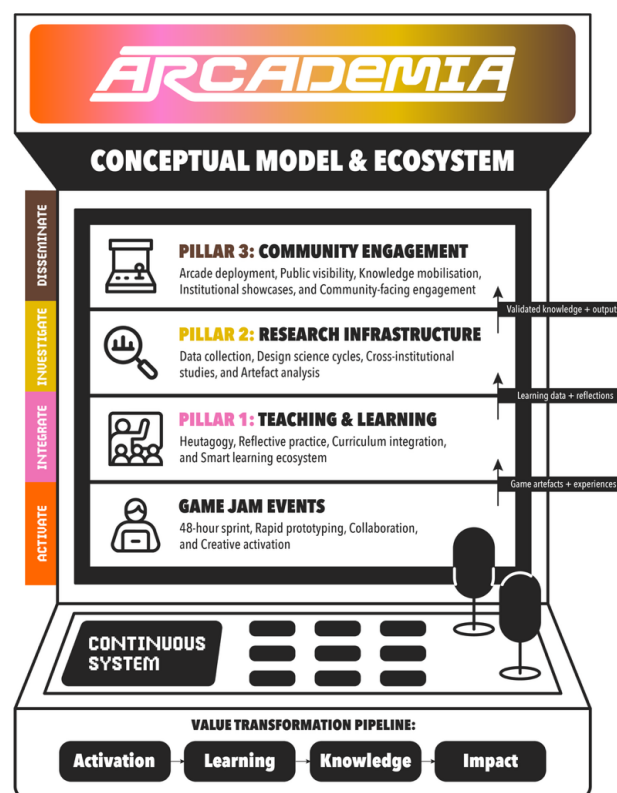


Figure 1: The Arcademia ecosystem model

Together, the activation mechanism and the three pillars constitute an ecosystem that addresses the core limitations of traditional game jams. Rather than treating the event as an endpoint, the model reframes it as the entry point into a sustained, interconnected system of learning, research, and engagement.

4. Implementation Case: Arcademia 2026

The Arcademia 2026 event provides an initial implementation of the proposed ecosystem model, demonstrating how the conceptual framework can be operationalised across multiple institutions. Participating universities included the University of Lincoln (United Kingdom), North-West University (South Africa), the University of Hull (United Kingdom), and the University of the Witwatersrand (South Africa), collectively forming a distributed, collaborative network. The event centred on a 48-hour international game jam in which over one hundred students participated, resulting in 29 submitted games hosted on a shared itch.io platform. Students worked in collaborative teams or individually under a common theme, engaging in rapid ideation, prototyping, and development. The jam functioned as the primary engagement foundation of the ecosystem, facilitating experiential learning and interdisciplinary interaction across institutional boundaries. Coordination between sites was supported through digital communication platforms and a shared livestream, which acted as a connection between institutions. This enabled synchronised participation, real-time visibility of progress, and a sense of collective presence despite geographic separation. Judging was conducted at local and regional levels, allowing for contextual evaluation while maintaining alignment with the broader international structure. Importantly, the implementation extended beyond the event itself: selected games were prepared for deployment on physical arcade cabinets at participating institutions, contributing to the persistence of artefacts and the visibility of student work within public and academic spaces. In this way, Arcademia 2026 illustrates how the ecosystem model integrates event-based activity with ongoing teaching, research, and community engagement.

4.1 Preliminary Participant Feedback

Immediately following the event, participants were invited to complete a short, anonymous feedback survey. Given the very small, self-selected sample ($n = 7$), the results below are reported as early, indicative signals about participant experience rather than as validated findings, and are offered as illustrative context for the implementation case rather than as empirical support for the ecosystem model's broader claims. Overall experience was rated positively (mean 8.3 out of 10; range 6–10), and six of seven respondents felt that the shared livestream enhanced, rather than distracted from, their experience. Five of seven respondents reported a measurable increase in their confidence as a developer or designer, and six of seven indicated interest in joining a future Arcademia alumni network, an early signal of appetite for the kind of sustained community engagement the model proposes. Suggested improvements clustered around event logistics, such as accommodation, pacing, and venue noise, and around expanding institutional participation in future editions, both of which foreshadow the scalability and resourcing considerations discussed under Limitations below. Consistent with the conceptual and exploratory aim of this paper, a systematic and validated evaluation of these outcomes is left as a direction for future work.

5. Discussion

Having outlined the ecosystem's architecture and its initial implementation, this section considers Arcademia's significance for game-based learning research and practice, and reflects on the limitations that must be addressed as the initiative matures.

5.1 Benefits for Gameful Learning

From a pedagogical perspective, Arcademia reinforces and extends the benefits traditionally associated with game jams. The initiative provides an authentic development environment in which students engage with real constraints, deadlines, and collaborative dynamics that mirror professional practice. Such authenticity supports the development of both technical competencies and transversal skills such as communication, teamwork, and problem-solving, as identified in prior studies on experiential and project-based learning (Fang 2012; Gonzalez-Marcos et al 2016; González-Cespón et al 2024). A distinguishing feature for Arcademia, however, is its ability to “close the loop” on learning. Rather than terminating at prototype submission, student work persists through arcade development and public exhibition. This persistence introduces an additional layer of accountability and ownership, as students produce artefacts intended for continued use and visibility. These conditions are logically associated with heightened intrinsic motivation and deeper engagement, although empirical validation of this claim remains a direction for future study (Chalofsky and Krishna 2009). Furthermore, the cross-institutional

nature of the initiative expands the social dimension of learning. Students interact not only with local teams but also within a global network of peers and educators, fostering exposure to varying perspectives and practices. This aligns with social constructivist principles, where knowledge is co-constructed through interaction, and suggests that Arcademia may enhance collaborative learning beyond what is achievable within isolated institutional settings (Hausfather 1996).

5.2 Research Opportunities

Arcademia presents substantial opportunities for research, particularly within the scholarship of teaching and learning and game-based learning domains. By functioning as a “living laboratory”, the initiative enables the systematic study of phenomena that are otherwise difficult to capture in controlled environments. Potential research avenues include the analysis of game design processes under time constraints, patterns of collaboration and team dynamics, and the relationship between constraint-driven creativity and learning outcomes. Additionally, the availability of artefacts across multiple institutions allows for comparative analysis of design approaches, thematic interpretations, and technical implementations. The ecosystem structure further enables longitudinal studies, which are notably absent in much of the existing game jam literature (Faas et al 2019). For example, researchers may examine how participation influences student development over time, including skill acquisition, confidence, and career trajectories. Similarly, the persistence of arcade-deployed games creates opportunities to study player experience and engagement beyond the original development context. Finally, the cross-institutional nature of Arcademia supports collaborative research efforts, enabling larger datasets and more generalisable findings. This positions the initiative as a platform not only for pedagogical innovation but also for sustained scholarly contribution.

5.3 Limitations

Despite its conceptual and practical contributions, Arcademia introduces several challenges that must be acknowledged.

First, the coordination of multiple institutions across different regions entails logistical complexity, including time zone alignment, communication management, and the standardisation of processes such as judging and submission protocols. These factors require careful planning and may limit scalability if not addressed systematically. Second, infrastructure requirements also present a constraint. The deployment and maintenance of arcade cabinets, alongside supporting digital platforms, demand financial and technical resources that may not be equally available across all institutions, raising questions regarding accessibility and equity within the ecosystem. Furthermore, while the initiative is designed to support sustained engagement, participation remains highly dependent on institutional buy-in and availability. Without formal integration into curricula or structured programmes, there is a risk that engagement may fluctuate over time. Finally, this paper is deliberately conceptual in aim: it introduces and grounds the Arcademia ecosystem model rather than presenting a validated empirical evaluation of it. The preliminary feedback reported under the Implementation Case offers early, indicative signals rather than validated findings, and the broader claims regarding enhanced motivation, learning outcomes, and ecosystem benefits remain, at present, partially inferential. While grounded in established theory and early observations, these claims require empirical validation through systematic data collection and analysis. Addressing this limitation forms a critical direction for future work.

6. Conclusion

This paper addresses the question of how game jam initiatives can be structured as sustainable learning ecosystems that extend teaching, learning, research and community engagement beyond the temporal boundaries of the event itself. While game jams are effective for experiential and collaborative learning, their impact is often diminished by a lack of continuity and integration within broader institutional structures. In response, this paper presents Arcademia, an international initiative that reframes the game jam as the foundation of a sustained learning ecosystem. By enabling persistence beyond the event itself, Arcademia extends the value of student work, supports ongoing scholarly inquiry, and strengthens collaboration across educational institutions.

The Arcademia 2026 implementation demonstrates how this model can be operationalised across four universities in two countries, with 29 games produced, early participant feedback indicating a positive overall experience, and selected artefacts prepared for deployment on physical arcade cabinets. This contributes a practical, replicable model for structuring game-based learning initiatives as ecosystems rather than isolated events.

To build upon this foundation and address current logistical and infrastructural limitations, future work will focus on refining cross-institutional coordination while expanding participation. Crucially, future efforts will also prioritise conducting longitudinal studies and gathering empirical data to rigorously validate the initiative's impact on student motivation, learning outcomes, and participant development. Ultimately, Arcademia demonstrates that game jams can serve as powerful entry points into sustained educational infrastructures, where learning, research, and community engagement are continuously connected.

Ethics Declaration: This study reports on a conceptual framework and initial implementation of the Arcademia initiative and does not involve the collection or analysis of personal or sensitive human participant data requiring formal ethical clearance. As such, no institutional ethics approval number is associated with this work. Ethical approval will be obtained for all future empirical studies, data collection activities, and evaluative research arising from this initiative, and such work will report the relevant ethics clearance details in accordance with institutional and international research standards.

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