Mapping Emergent Patterns of Landscape Architect User Experience in Creation Games to Describe Digital Landscapes

Auriga Joy Rosell[1], Nappy Navarra[2]

[1]University of the Philippines Diliman, Quezon City/Philippines · abrosell@up.edu.ph
[2]University of the Philippines Diliman, Quezon City/Philippines · nlnavarra@up.edu.ph

Abstract: Creation games provide an accessible setting for landscape architects to craft "digital landscapes," merging traditional expertise with virtual flexibility. Through interviews with landscape architecture graduates, this study identifies emergent attitudes – self-imposed boundaries, co-creative roles, and iterative design strategies – demonstrating how design professionals adapt actual natural and built environment practices to unconstrained virtual spaces. Landscape architect participants revealed ways these virtual spaces go beyond physical constraints while still drawing on non-digital expertise, offering new avenues for prototyping and visualization. The results suggest that these parallel worlds serve multiple functions: from speculative experimentation and professional-level visualization to purely recreational exploration. In highlighting the potential for specialized digital tools and expanded human-computer interactions, the study opens new avenues for evolving landscape architecture practices.

Keywords: Digital landscapes, human-computer interaction, creation games, emergent patterns, games user research

1 Introduction

1.1 Creation Games

Creation games are video games where the primary gameplay revolves around building or shaping the environment (McGregor 2007). These video games turn actual landscape elements into data that players can manipulate (Nunes 2019). As the virtual space shifts from something to play in to something to play with, this facilitating and reactive environment allows different styles of interaction to emerge – ranging from open-world experimentation to structured design challenges (Candy 2020).

1.2 Virtual Spaces

While digitally represented spaces often draw on actual natural and built environment precedents (STEENSON 2017), the abstraction of landscape assets in creation games "simpliflies the complexity of the landscape system" (Cantrell & Holzmann 2015). This enables designers to act upon virtual spaces without being overwhelmed by physical constraints. These assets still retain "relevant meanings," suggesting that even in their simplified form, they link back to broader landscape principles (Fernberg et al. 2021). Such game assets can be classified according to their functional roles within the overall digital environment (Vaez Afshar et al. 2023). These approaches collectively inform the core inquiry of how professional familiarity with actual land-based systems influences design decisions in a virtual context. And in the context of this research, the actual refers to the natural and built environment, existing materially in space and time, while the virtual encompasses digital spaces – incorporeal yet real intensities that emerge from but remain autonomous to actual processes (Bogard 2018).

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1.3 Landscape Architect Players

Introducing landscape architects into these environments yields a nuanced discourse, where professional training intersects with generative digital platforms to produce new design approaches and outcomes (FERNBERG et al. 2021). For landscape architects, these digital affordances extend human capability for creative exploration, inviting them to apply their professional expertise to a realm unconstrained by actual physics, budgets, or regulations (NUNES 2019). The process of constructing or iterating on virtual elements could provide insights into how such digital landscapes evolve under specific user influence.

1.4 Hypothesis

The complexity built into generative systems, such as creation games – linking human, computer, and interaction elements – produces unforeseen outcomes or emergent patterns. (DEGHEDI 2018). Iterative gameplay interactions may reveal emergent properties or typologies that cannot be inferred solely from analysing the game's rules or initial conditions (CANTRELL & HOLZMAN 2015). Such patterns could inform future prototyping of digital technologies that continue to evolve with the practice of landscape architecture (FERNBERG et al. 2021). Furthermore, the inclusion of landscape architecture professionals as players brings its own *programmed sociality*, shaping both the creation process and the resulting digital landscapes (NUNES 2019). By investigating these patterns, the study reveals how professionally informed design unfolds within creation games, offering a deeper understanding of the role of landscape architecture in shaping and interpreting virtual spaces.

2 Theoretical Framework

2.1 Professional Design Knowledge and Reflection-in-Action

Landscape architects apply professional knowledge to virtual environments, adapting spatial logic and user-centred design principles. SCHÖN'S (2013) reflection-in-action foregrounds the language and logic of digital landscape design by describing how designers iteratively refine their work in response to emergent conditions. RAAPHORST et al. (2019) highlights how professionals bring unique interpretations to digital spaces, shaping virtual landscapes through expertise-driven decision-making.

2.2 Perception in Virtual Landscapes

Spatial cognition shapes how players navigate and interpret virtual landscapes. Landscape architects use visual cues to guide movement and structure user-space interaction in digital environments (ÖKSÜZ & KIM 2024), much like how video games employ wayfinding mechanics that prioritize perceptual anchors over real-world scale (KORKMAZ & KIM 2022). In virtual reality, where sensory input is limited to visual and auditory stimuli, players rely on environmental anchors and proxemic behaviors to adapt spatial awareness to digital constraints (KIM & SUNG 2024). By examining recurring patterns in how participants describe, manipulate, and evaluate digital landscapes, the study highlights how cognitive processes – rooted in user experience – shape digital landscape design and interpretation.

2.3 Complex Systems in Emergent and Interactive Landscapes

Digital landscapes function as complex systems, where interactions between landforms, game mechanics, and user actions produce emergent patterns (M'CLOSKEY & VANDERSYS 2017). Creation games exemplify emergence (MURPHY & PER 2011), where simple rule sets generate diverse outcomes through player experimentation (DEGHEDI 2018). This aligns with McHarg's Overlay Design Methodology, which has been adapted for structuring game environments (KIM et al. 2018), demonstrating the intersection of landscape architecture and game design in computationally analysing and organizing virtual landscapes.

3 Method

The study sought to uncover interactions (ANDERSON n.d.) that potentially define the intersection of landscape architecture and creation games through adopting an *exploratory* methodology (Figure 1). This not only addresses a gap in existing literature regarding the iterative nature of design in creation games but also contribute to the broader discourse on the evolving relationships between human-computer interactions and landscape practice.

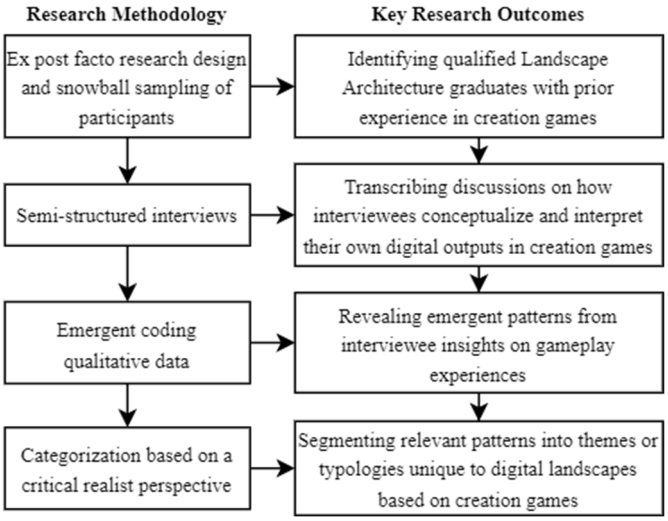

Fig. 1: Research Methodology

An *ex post facto* design ensured participants – landscape architects with prior virtual creations – had relevant expertise. *Snowball sampling* identified *16 landscape architecture graduates* with at least seven hours of creation game experience. Formal licensure was not required, but academic training in landscape architecture provided sufficient familiarity with 3D representation tools. Participants provided informed consent and could withdraw at any time.

Semi-structured interviews explored key themes – Demographics, Informative, Values, Behavior/Experience, and Expertise (Table 1) – guided by frameworks such as the Design Process (SASAKI 1950), Player Experience Inventory (ABEELE et al. 2020), MDA Framework (HUNICKE et al. 2004), and User Interviews (ROSALA & PERNICE 2023). Five pre-test inter-

views refined question clarity, and some participants provided images of their creations as visual supplements.

Table 1: Summary of the interview guide

Interview Category	Focus	Sample Topics
1) Demographic	Collecting participant identifiers	Name, age, occupation, pronouns
2) Informative	Understanding participant background and gaming profile	Gaming preferences, introduction to gaming, creation games played
3) Values	Uncovering reasons for engaging in creation games	Motivations for play, sharing/using creations, views on collaborative building
4) Behaviour/ Experience	Exploring design processes and in-game behaviours/experiences	Creation workflow, decision-making influences, duration, handling limitations
5) Expertise	Examining how a Landscape Architecture background informs practice	Influence on professional practice, personal reflections on what are digital landscapes

The interviews were transcribed and then *annotated* by labeling key text with codes, *conceptualized* by aligning codes with critical themes, and *segmented* by positioning and connecting those themes into distinct categories (REV 2022). Three analytical frameworks informed the qualitative coding process: *Characterization of Patterns* examined similarity, difference, frequency, sequence, correspondence, and causation (SALDAÑA 2021). *Types of Thinking* explored lateral, divergent, metaphorical, enacted, and embodied thought processes (DEE 2004). *Layers in Visual Rhetoric* analyzed linguistic, denotative, and connotative elements (RAAPHORST et al. 2019).

Following a critical realist perspective (STUTCHBURY 2022), coded data was categorized into three levels: *observable surface knowledge*, *researcher-informed insights* influenced by literature, and *emergent findings* beyond preliminary assumptions. The final category reveals how digital landscape design is shaped by professional expertise, personal motivations, and in-game dynamics through an analysis of participants' verbal and visual expressions in creation games.

4 Results

Among *439 codes* that resulted in *32 categories*, some emergent findings were: *use cases, self-imposed rules, co-creation, roles, environment,* and *digital landscapes.* Furthermore, the most played creation games were the following video game titles: *Minecraft, Sims, Genshin Impact, Cities Skylines, and Animal Crossing.*

4.1 Use Cases

Participants were found to leverage creation games to develop *parallel* landscapes for various uses, primarily visualization. By manipulating simplified forms, they gauge how non-digital designs might appear, despite lacking the full ecological or practical constraints. In addition, these parallel landscapes enable recreation and reimagination of actual sites (Figure 2), of-

fering a platform to experiment with desired improvements or test traditional design principles (Figure 3). Beyond functional exploration, some players employ creation for pure leisure, speculative designs, or as a reference tool to inspire future work.

4.2 Self-Imposed Rules

Despite the relative boundlessness of most creation games, participants frequently impose *personal rules***.** This entails goal setting, thematic constraints (Figure 4), site suitability (Figure 5), and even considering virtual weather, or professional construction standards. Users also define zoning for public/private spaces and coordinate progression or competitions among themselves. These self-imposed constraints stem from a desire to *improve* actual or in-game spaces, the limitations or affordances of *game mechanics*, and *embodied inspiration*, such as adherence to professional design standards. They are also shaped by *peer influence*, where players adopt challenges or prompts from others, as well as *social considerations* like fair play and competitive dynamics.

Use Cases	Self-Imposed Rules	Environment
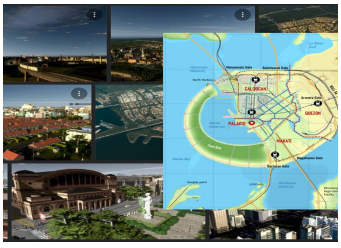		
Fig. 2: Output reimagining actual city for iterating	**Fig. 4:** Output according to self-imposed tropical theme	**Fig. 6:** Output solely built for in-game socializing
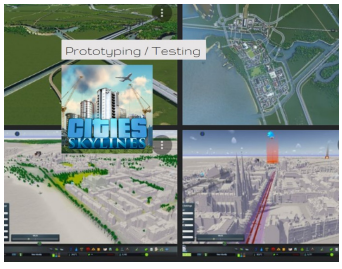		
Fig. 3: Output simulating actual city for testing	**Fig. 5:** Output based on perceived site suitability of game-provided mountainous setting	**Fig. 7:** Output focused on experiential walkthroughs

4.3 Co-creation and Roles

Multiplayer features in creation games yield co-creation dynamics, where some participants meticulously coordinate with peers in synchronous or asynchronous sessions, while others prioritize individual goals (sometimes even destroying others' works). This social interplay

revealed distinct roles in co-creation games. Gatherers collect resources, while Level Designers shape environments for others. Improvers, Connectors, and Landscapers enhance group creations using professional design principles, and Tour Guides orient visitors within completed spaces. These roles highlight the collaborative and dynamic nature of virtual design communities.

4.4 Environment

Participant-built virtual environments exhibit *immersion, interaction, exploration, and social* elements. *Social spaces* emerge when creators incorporate in-game characters or features that support multiplayer engagement (Figure 6). *Immersive spaces* arise from a user's intention to design for personal immersion, adjusting layouts after walking through the virtual environment – a form of reactive designing unique to digital landscapes. *Experiential spaces* use avatars, sound, and interactive cues to simulate a sense of presence within the virtual (Figure 7). Finally, *exploratory spaces* serve "what if" scenarios where creators push boundaries to design the improbable or wholly speculative.

5 Discussion on Digital Landscapes

Table 2: Participant differentiation of digital landscapes to actual natural and built environments

Characterization	Description	Participant Creations
1) Impractical	Frees creators from non-digital constraints (e. g., safety, ecology, budgets), viewed positively for allowing unrestricted creativity.	Building a "giant banana" in a virtual world
2) Impossible	Encompasses designs that cannot be built in actual physical environments.	Creating "floating islands"
3) Aspirational	Permits creations that are feasible virtually but remain out of reach due to personal resource limitations (time, money, etc.).	Building a "dream house" in The Sims
4) Referential	Replicates or simulates actual spaces, serving as a direct reference.	Copying the urban plan of Manila in Cities Skylines
5) Instantaneous	Allows rapid visualization and construction, dramatically faster than non-digital processes.	N/A

Collectively, participants describe digital landscapes as a medium for pushing physical boundaries, visualizing design changes, exploring creative ideas, and introducing others to the discipline of landscape architecture (Table 2). They liken these to a "window to a parallel world," highlighting their capacity to surpass physical limitations. It is also seen as an "unexplored territory." Despite these advantages, participants highlight the need for a more specialized, "purely landscape sandbox tool" – beyond existing gaming platforms – for digital design. Notably, digital landscapes hold further potential as both a source of enjoyment for professionals and a gateway of interest for non-specialists.

Segmenting the categories encompass the variety of user experiences, resulting into seven creation typologies that define digital landscapes in creation games (Table 3). These typologies reveal how digital landscapes function as evolving, multifaceted domains shaped by both professional expertise and user-driven exploration of landscape architecture professionals.

Table 3: Digital landscape typologies

Characterization	Description
1) Connective	Builds communal virtual spaces for collaboration (asynchronously or synchronously).
2) Generative	Produces outputs centred on the creator's personal ideas or aesthetics
3) Immersive	Enables continued post-creation activities, merging actual and in-game selves
4) Speculative	Pushes beyond physical constraints
5) Reimaginative	Improves actual spaces through digital modifications
6) Representative	Simulates the actual natural and built environment for practical uses
7) Creative	Focuses on the act of creating as a leisurely, self-driven pursuit

5.1 Potential Drawbacks and Limitations

Although creation games offer a range of enabling features, participants identified limitations related to factors that encompassed physical constraints, limited resources, and in-game restrictions that shaped their designs. In response, participants mentioned adaptive strategies by compromising on certain design elements and exercising resourcefulness. These limitations did not entirely impede their creative output and highlighted the capacity of players to innovate within constraints – a point that warrants further investigation into how such restrictions may both challenge and fuel design processes. Additionally, reliance on participant recall during semi-structured interviews introduces potential gaps or memory biases in the data. And the niche requirement of recruiting only landscape architects who utilize creation games constrained the sample, potentially affecting the overall generalizability of the study's conclusions.

6 Conclusion and Recommendations

This study demonstrates how creation games enable "parallel" or "alternate" worlds – digital landscapes that blend embodied influences and virtual design affordances – to expand the boundaries of landscape architecture practice. Participants, all landscape architecture graduates, revealed emergent attitudes in their virtual creations through self-imposed rules, co-creation, and iterative processes, underscoring the synergy between non-digital professional practices (e. g., design standards, ecological principles) and digital system provisions unique to gameplay.

These findings illustrate that digital landscapes can serve multiple purposes, from speculative experimentation (floating islands, reimagined sites) to professional-level design tests (non-digital proposals visualized in-game). At the same time, they offer new forms of user interaction – social, immersive, or purely creative – driven by aspects such as metagaming or collaborative roles (e. g., gatherer, level designer, landscaper). Consequently, creation games

allow landscape architects to explore ideas and iterate designs unencumbered by physical constraints, while still maintaining conceptual links to actual environments.

To address memory bias in participant recall, future studies might incorporate real-time gameplay observation, eye-tracking, or screen recording analysis to capture the nuances of decision-making and spatial reasoning. This approach would deepen the understanding of how digital landscapes influence design processes while minimizing retrospective gaps in participant reporting. Broader or longitudinal studies could consider cultural and regional variables, as well as the impact of continuing technological shifts on game platforms.

Creation games highlight the growing role of digital design tools in landscape architecture. By enabling rapid iteration, these tools allow designers to explore possibilities, refine concepts, and communicate visions more fluidly than traditional workflows, which are often limited by material, time, and regulatory constraints. This integration of digital and conventional methods opens new pathways for innovation in landscape architecture in an increasingly digital future.

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