Exploring the Pedagogical Value of Game Design for Landscape Architects

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Abstract: This study forms part of the ongoing project entitled THEATRUM conducted by Gabrielle Bartelse, which explores the pedagogical value of game design in landscape architecture, emphasising the role of virtual landscapes as educational tools. By applying game design principles such as narrative, immersion and flow, the paper investigates how Open-World Video Games (OWVG) can support landscape architects in developing design and research skills. Furthermore, in the framework of the THEATRUM project's aims, Mór Grommers (2022) proposes in his Bachelor Thesis six core functions of landscapes namely creating atmosphere, storytelling, providing consistency, integrating with objectives and puzzles, offering topographic guidance, and implementing gating mechanisms. Grommers's original research establishes a strong foundation for further interdisciplinary studies. Employing a mixed-methods approach, combining literature review, theoretical synthesis, and empirical data from a survey of 204 gamers, the study examines how the above mentioned functions align with the motivations of different player types, such as *Killers, Achievers, Socialisers,* and *Explorers*, as defined by Bartle's taxonomy. Findings reveal that detailed landscapes, freedom of exploration, and narrative elements are critical for promoting immersion. These insights offer valuable guidance for integrating game design principles into landscape architecture education, mainly through innovative technologies such as VR and AR. The study also highlights the importance of collaboration between game designers and landscape architects to create virtual environments that are experimental, functional, and visually compelling. Such environments can serve as platforms for creative exploration, participatory design, and experiential learning, giving landscape architecture students giving landscape architecture students a deeper understanding of the dynamic interactions between humans and landscapes.

Keywords: Game design, virtual reality (VR), augmented reality (AR), mixed reality (MR)

1 Introduction

The ongoing project, THEATRUM (Latin for Playground) is a virtual space for exploration, creativity, and collaboration (WAGENINGEN UNIVERSITY 2023, BARTELSE et al. 2024). In the framework of co-operative work between instructors and specialising students, the project also motivated MÓR GROMMERS (2022) completion of his unpublished Bachelor Thesis. Guided by Gabrielle Bartelse and Ron Lammers, GROMMERS (2022) examined the dynamics of Landscape in Open-World Video Games (OWVG) and identified six core functions of landscapes: a. creating atmosphere, b. storytelling, c. providing consistency, d. integrating action with objectives and puzzles, e. offering topographic guidance, and f. implementing gating mechanisms. While Grommers's study opens significant channels for further investigation, it does not touch the educational implications regarding the OWVG participants, individual and collectively, as they are absorbed into the twists of the game. The authors of this article believe that the above mentioned typological analysis can be used to train, develop, and educate participants in various ways, such as socially, historically, culturally, ethically and aesthetically. The above insights, thus, have been integrated with updated academic discourse to highlight the evolving role of landscapes as immersive tools in developing gaming environments in diverse educational settings. Based on the already defined six core functions

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of landscapes, this study further explores how players have experienced Virtual Online Worlds (VOWs) by questioning how landscapes influence player immersion and interaction in OWVG. This line of questioning aims at connecting the sentiments of immersion and interaction with the teaching/learning interaction, which is based on attention, interest, and participation. In this context, we investigate the process of designing a pedagogically virtual landscape in terms of perception, functionality, and creation for the benefit of landscape architect students and game players.

The aim of this study is twofold: scholarly, to bring immersion in OWVG to the fore as testing environments in landscape architecture and educationally, to merge theoretical views and survey findings into practical applications for game design and landscape architecture. This dual aim also aligns with the THEATRUM'S broader educational vision, namely, to create a Virtual Online Playground where researchers, practitioners, and landscape architect students develop creative and innovative solutions for the wicked problems that impact daily-shared environments.

2 Literature Review

Integrating play/game with education has diachronically been a highly constructive approach in pedagogy (VYGOTSKY 1978, PARKER et al. 2022). However, past methodologies and approaches, yet historically important, must adapt and set the pace according to technological advancement especially in the development of virtual spaces. Within gaming, landscapes transcend mere visual backdrops to become dynamic arenas of interaction, where players are drawn into compelling narratives, visual stimuli, and boundless opportunities for exploration. RICHARD BARTLE'S (1996) Multi-User-Dungeon (MUD) theory is central to understanding these interactions, which is fundamental to the study of virtual environments. Even more critical are BARTLE'S (2003, 2022) successive and updated publications about the implications of the design of virtual worlds and what these can teach about one's factual reality. Bartle's MUD theory illuminates the diverse motivations of players by categorising them into four distinct archetypes – *Killers, Achievers, Socialisers,* and *Explorers* – each with unique ways of engaging with and interpreting the landscapes around them. While Bartle's model has evolved, with researchers like YEE (2006) expanding its scope, this prototype remains a vital lens through which the interplay between player behaviour and landscape design can be understood. Educationally, a rich body of research underscores the pivotal role of game design and immersive Virtual Learning Environments (iVLEs) as transformative pedagogical tools (DEDE et al. 2009, MIKROPOULOS et al. 2011, KOSTER 2013, CARBONELL-CARRERA 2021).

According to Bartle's typology (1996), the player's engagement within the virtual world of games represents a distinct set of preferences and motivations, shaping their interaction with their fellow players and the relevant game environment. After his initial ground-breaking research, in which Bartle identified four player types, he refined the four types in his subsequent studies and expanded them to eight-player types (BARTLE 2003, 2022).

The four player's behaviours and their aims according to BARTLE (1996) are as follows:

1) *Killers* revel in competition and dominance. Their thrill lies in confronting and outmanoeuvring others, transforming game landscapes into battlegrounds of strategy and

power. For *Killers*, the environment is used as a space to hide, exploit, and apply strategies in their quest for control and supremacy.
Aim: To deal with volatile zones that teem with conflict and high-stakes challenges.

2) *Achievers* are driven by the pursuit of excellence and the satisfaction of accomplishment. The landscape is a structured pathway to progress for these players, laden with goals to conquer and rewards to claim. Their journey is marked by a relentless drive to master the challenges ahead.
Aim: To project environments that support clear objectives and milestones, rewarding the players' "supernatural" efforts with tangible progress.
3) *Socialisers* find joy in connection and camaraderie. For them, the game world is a vibrant social hub, a shared space where relationships are forged, and experiences are interchanged. The landscape becomes a backdrop for collaboration and community, promoting interaction at every turn.
Aim: To gravitate toward communal spaces, safe zones, and areas that facilitate meaningful encounters.
4) *Explorers* are adventurers driven by curiosity and a thirst for discovery. They see the landscape as a treasure trove of secrets and stories, inviting them to immerse themselves in its depths and uncover mysteries. *Explorers* thrive on the thrill of the unknown, where every corner promise surprise.
Aim: To create an ideal playground, a spacious yet intriguing environment that stimulates interest and increases curiosity.

Bartle refined and extended his four types of player behaviour into eight types (BARTLE 2003, 2022). The *Killers* are subdivided into *Politician* and *Griefer*, *Achievers* into *Planner* and *Opportunist,* the *Socialisers* into *Networker* and *Friend*, and *Explorers* into *Explorer* and *Hacker*. In the framework of this research, we focus on Bartle's four archetypes. Interestingly, these archetypes are not rigid classification models but reflect character behaviour and motivations that can coexist and overlap within a single player. In the context of our educational target, understanding these interacting human tendencies allows game designers to craft landscapes that cater to a broader spectrum of player preferences, which can be most relevant in integrating pedagogical aims with players' entertainment targets.

2.1 The Symbiosis between Player Types and Landscapes

The interaction between player types and landscapes imposes a delicate balance, where the environment's design shapes player experiences, and player behaviour, in turn, influences how landscapes are perceived. For instance, *Killers* and *Achievers* often intersect in competitive spaces, where the former seek dominance while the latter strive for measurable success. *Socialisers* and *Explorers*, on the other hand, enrich each other's experiences through shared discoveries and collaborative interactions.

When participants were asked about three different OWVGs and the landscape's memorable attributes, their recollections centered on the emotional and stylistic qualities. Participants' responses to relevant questions highlighted terms like "cartoonish", "openness", "joyful" rather than describing on specific objects (GROMMERS 2022, 26). Furthermore, some expressed the impact of the landscape indirectly but clearly as a factor that renders the environment realistic, believable and the game while immersive, yet more tangible while playing. On the contrary, other participants said that due to the style and events, the game became more like an unreal playground: "the high amount of action and events resulted in a busy or chaotic feeling" where players could behave as they pleased (GROMMERS 2022, 27). Another voice experienced the landscape as a background scenery rather than a core mechanic, concentrating more to the style of the relevant game, consequently at the expense of excitement and intriguing mysteries of the exploration prospect.

The above notes promote the importance of a well-planned landscape as a crucial factor that contributes to storytelling and guides the player through the game in a stylish yet meaningful experience. By guiding the player forward, it indicates the line of action, one's potential to seek and act accordingly while informing topographically and contextually. These remarks can easily be reflected in basic educational principles and norms.

In this context, the designing of landscape gains momentum to be analysed scholarly regarding its role in shaping a proper virtual environment. From an educational viewpoint, the endeavour can transmit, directly and indirectly, meaningful pedagogic messages on human values. Based on studies on the importance of the physical environment in building individual and collective characters and behaviours (VOLMAR et al. 2019, GOODMAN et al. 2022) worldviews etc., especially the way games increase in popularity, we believe, by weaving together diverse human needs, designers can create environments that resonate with different player types, encouraging engagement and concentration, both essential factors educationally constructive. Although analogue design lessons within landscape architecture, mainly through studio-based education, continue to play a crucial role– much like the initial analogue sketches in design offices – a Virtual Online Environment, according to the authors of this paper, presents significant opportunities as a laboratory space and testing ground.

A VOW can function as an extensive virtual design studio, where the project site is a realistically reconstructed- virtual model. Within this model, proposed design interventions and solutions can be tested in real time and adjusted as necessary. This design-based research approach allows for the direct application of research through a design methodology. Another advantage is that specialists from different disciplines can collaborate within the same environment to develop aesthetically pleasing and sustainable solutions to challenges in landscape architecture. To ensure that this VOW/testing laboratory operates effectively and facilitates the formation of the right teams, it is essential to have a clear understanding of player types and how they are influenced by the landscape of the 'realistic' VOW.

2.2 Implications for Game Design and Education

Literature on landscape functions in game design is scarce. Therefore, based on research on 'player types' by BARTLE (1996, 2003, 2022), 'immersion' by BONTCHEV et al. (2019), BROWN et al. (2014), and 'game flow' by ACELAND et al. (2020), and PUJOL et al. (2023), as well as the foundational works by DEDE et al. (2009) and MIKROPOULOS and NATSIS (2011), the six core landscape functions identified by GROMMERS (2022) were synthesised from research on immersion and player engagement and discussed below:

1) *Creating atmosphere*: Landscapes are crucial in shaping a game's atmosphere by influencing the player's emotional experience. RIBEIRO et al. (2020) define game atmosphere as the emerging subjective experience of a player caused by the strong audio-visual thematic cohesion of a game's elements. The interplay of graphics and sounds is central to creating an immersive atmosphere, with landscapes contributing to this cohesion.

Additionally, MIHALZ CSÍKSZENTMIHÁLYI'S (1990) Flow theory highlights that landscapes enhance immersion, reinforcing a sense of belonging in the game world. The ability to evoke emotions – such as claustrophobia in enclosed spaces or freedom in vast open areas- demonstrates the landscape's role in shaping player experience, particularly in OWVGs.

2) *Telling a Story*: Landscapes contribute significantly to environmental storytelling, guiding players through visual and contextual cues. FERN (2020) refers to this as ecological storytelling, where elements like changing seasons, abandoned ruins, or weather effects provide historical context to the game world. Players often remember emotionally charged moments rather than linear narratives (DAHLEN 2014), making visual storytelling an effective tool. Techniques such as lighting, colour, contrast, and telegraphing can subtly guide a player's understanding of the game world (ZELVING 2019).
3) *Providing consistency*: For a game world to be immersive, it must maintain internal consistency, ensuring logical cause-and-effect relationships within its mechanics. Games operate within defined rules, including physics, time and object permanence, which help maintain player engagement (ATLAS 2018). Pattern recognition, an essential cognitive function, allows players to anticipate interactions, making consistency essential (FORTE, 2018). If landscape fails to maintain logical continuity – such as a burned-down house inexplicably reappearing – the immersion is broken. The effective game design ensures that landscapes behave in a predictable, rule-driven ways, reinforcing a coherent in-game universe (ALLMER 2009).
4) *Being Part of Objectives and Puzzles*: Landscapes facilitate gameplay by directing players towards objectives and integrating puzzle elements. Games often provide environmental hints to help players identify interactive areas without overt instructions (BRACKEYS 2018). Elements like footprints in the snow, breakable walls, or sound cues can subtly inform players of puzzles or upcoming events (ALLMER 2009). This approach maintains immersion while ensuring engagement through discovery and curiosity.
5) *Providing topographic guidance*: Navigation in games extends beyond maps; it relies on spatial structuring and environmental landmarks. Practical topography helps players orient themselves intuitively without relying on explicit coordinates (GOMES-MAUREIRA et al. 2021). Large structures, such as mountains or towers, can act as focal points guiding players naturally through the game world. JOHN HARRIS (2007) emphasises that designers must balance guidance and exploration to prevent players from feeling lost or overly restricted. Environmental storytelling further enriches navigation by transforming space into meaningful *places* with historical and narrative significance (HARRISON & DOURISH 1996).
6) *Gating mechanisms* in game design create boundaries that restrict access to certain areas, often for pacing and progression. While OWVGs aim for a seamless, open experience, designers still use gating techniques – such as impassable mountains, high-level enemy zones, or required tools – to manage player progression (CEDRIC 2001). Gating ensures that players remain engaged by gradually unlocking new territories, rewarding progression, and maintaining a structured gameplay experience.

These functions encapsulate the essence of what makes virtual landscapes compelling and meaningful. They serve as the scaffolding upon which immersive and engaging experiences are built, with particular relevance to educational applications in landscape architecture.

Bartle's framework further deepens this understanding, offering a roadmap for designing environments that captivate and educate, making virtual worlds a powerful medium for learning and exploration.

3 Methodology

This study aims to provide insight into the functions of landscapes within online environments and the aspects necessary to specific player types. It does so by focusing on:

1) Identifying six core functions of landscapes in games crucial for immersion and user experience.
2) Determining which of these functions is vital for specific player types, as defined by BARTLE (1996).
3) Exploring the potential integration of gaming elements into landscape architecture education to enhance students' design and research skills.

The study adopts a mixed-methods approach, integrating quantitative and qualitative data to explore the pedagogical value of game design for landscape architects. The methodology for this research involved a combination of literature review, theoretical framework development, and empirical data collection using a survey. This multi-step approach allowed the study to establish a robust understanding of game landscape functions, their connection to player types, and the potential application of game-based design principles within landscape architecture education. By integrating numerical data and contextual insights, this methodology aligns with the study's objectives: identifying key game landscape functions, examining their relevance to different player types, and exploring their educational potential.

3.1 Research Design

The study follows a convergent parallel mixed-methods design (CRESWELL 2014), where quantitative and qualitative data are collected simultaneously, analysed separately, and compared during the interpretation phase. This design was chosen to capture measurable trends (e. g., which landscape functions are most important for immersion) and rich insights into participant experiences with game landscapes. It is particularly suitable for exploring the impact of landscape features on immersion and how these insights can inform educational practices. Quantitative data provide measurable trends, such as which landscape features enhance player immersion. In contrast, qualitative data explore how these features engage participants to identify themes related to the pedagogical value of game landscapes.

3.2 Sampling/Participants

The target population consists of individuals with experience playing OWVGs, as they are most likely to provide relevant insights into how game landscapes contribute to immersion. A purposive sampling technique (CRESWELL 2014) was used, sampling 204 participants. The selection criteria required that participants have specific experiences, such as playing at least three different OWVGs, with those lacking such experience being excluded. This ensures that participants are familiar with various game landscapes and can provide meaningful input on their immersive qualities and ensures that the sample is both relevant and diverse, addressing the study's objectives.

3.3 Data Collection Method

The primary data collection instrument was a self-administered online survey, combining Likert-scale questions to measure the importance of specific landscape functions (e. g., visual complexity, environmental storytelling, freedom of play, and music) and open-ended questions to allow participants to describe memorable experiences in landscape features. Data collected included respondents' preferences and perceived contributions of landscape functions to their immersive experience. This dual approach allowed for both quantitative measurement and qualitative insights, enriching the findings and providing a nuanced understanding of how landscape functions support player engagement across different types.

Data analysis followed CRESWELL'S (2014) guidelines for mixed-methods research. Quantitative data were analysed via thematic analysis using Statistical Package for the Social Sciences to apply descriptive statistics (e. g., means, frequencies) to identify trends, such as the importance of certain landscape functions for immersion.

3.4 Challenges of Immersion in Digital Environments

While immersion is often heralded as a key advantage of digital environments, it presents inherent challenges. For some users, highly immersive environments can be distracting, limiting focus or accessibility. Others may find such environments overly prescriptive, constraining their perspectives rather than enhancing creativity. These issues raise questions about how landscape architects can design experiences that balance guidance and user agency. Furthermore, accessibility concerns must be addressed to ensure that immersive experiences cater to a diverse audience, including those with varying levels of digital literacy and physical abilities (CHEN 2007, GREENWOOD 2021).

4 Findings

4.1 Landscape Functions and Player Types

Each function plays a specific role in supporting the gameplay experience of Bartle's four player types. For instance, *Killers* primarily use landscapes strategically to gain advantages, while *Achievers* value landscapes that are integral to puzzles and objectives. *Explorers* appreciate diverse landscapes that invite discovery and experimentation, whereas *Socialites* view landscapes as social spaces for communication and relationship-building with other players. Many respondents consider the level of detail, storyline, freedom of play, and music as the most critical factors contributing to immersion in a gaming landscape. Players particularly valued the ability to explore the landscape freely, aligning with the sense of 'flow' within the game (CHEN 2007).

4.2 Educational Application of Game Landscape Design

Incorporating game design principles into landscape architecture education can help students better understand and apply cognitive and spatial aspects of landscape design. Using immersive game features such as VR and AR can provide landscape architecture students with a visual and sensory experience that enhances their design and evaluation skills. Mainly, 3D visualisations and the ability to 'walk through' a virtual landscape can be invaluable for the design and learning process (PHILIPS et al. 2015).

4.3 Expanding the Scope: Agency in Game Landscapes

The realism achieved in-game landscapes is often the result of advanced computational technologies and game design expertise that may lie outside the traditional purview of landscape architecture. Nevertheless, landscape architects can claim agency within this domain by focusing on these environments' design and educational capabilities. For instance, leveraging the immersive qualities of game landscapes can enhance landscape architecture students' design and research skills, emphasising experiential learning. Furthermore, landscape architects can advocate for and create scenarios where virtual landscapes are not just replicas of the real world but serve as experimental spaces that inform and improve real-world design practices (CARBONELLE-CARRERA 2021, PHILLIPS et al. 2015).

4.4 Feedback Loops between Users and Digital Environments

The potential for feedback loops generated from user interactions with digital environments introduces a dynamic dimension to the study. Players categorised as *Killers*, *Achievers*, *Socialites*, and *Explorers*, engage with game landscapes in ways that extend beyond mere consumption. For instance, *Explorers* may contribute to the evolution of a digital environment through detailed navigation and discovery, while *Socialites* create emergent narratives and collaborative dynamics within the space. These interactions raise pertinent questions about how digital environments can simulate and influence real-world perspectives and behaviours (BARTLE 1996, YEE 2006).

4.5 Real-World Implications for Players' Roles

As users engage with game landscapes, their roles as *Killers*, *Achievers*, *Socialites*, and *Explorers* can inspire new paradigms in real-world landscape design and education. For example, *Killers'* strategic use of game spaces to gain advantages could translate into strategies for understanding competitive resource allocation in real landscapes. Similarly, *Achievers'* focus on objectives and puzzles may influence project-based learning approaches in educational settings, where tasks are integrated into the landscape design process. *Socialites'* collaborative tendencies inform the design of participatory public spaces and *Explorers'* penchant for discovery might inspire more interactive and exploratory landscape features (CHEN 2007, GREENWOOD 2021).

5 Conclusion

This study promotes the potential and value of landscape architecture, with special attention on their educational role. By using player-centred design principles and game immersion mechanisms, student landscape architects can create spaces that are not only visually appealing and entertaining but also environmentally meaningful. To this end, educational norms and entertainment gaming approaches should be connected into the landscape design process, which must integrate three crucial elements into a harmonious entity: engagement, interest and action. To educationally develop the continuous dynamic interaction between humans and virtually constructed environments, this study offers recommendations to enhance the landscape architecture training accordingly. However, in the framework of the ongoing research project THEATRUM, these resulting proposals require further research for their practical implementation and in line with relevant educational requirements. Specifically, to evaluate and optimise the applicability of gaming landscapes in the context of traditional educational rules and aims, this study can be considered as a starting point for an interdisciplinary research field where landscape architecture and game design can enhance and enrich each other. Collaboration between the gaming industry and landscape architects can stimulate innovation beyond traditional 2D visualisation, leveraging the latest digital and immersive technologies developments. A significant aspect here is creating designs that are not only functional but also contribute to a holistic and inclusive user experience.

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