The Impact of Architecture and Learning Environment Design on Education: A Comprehensive Review Introduction to Innovative Learning Environments

In today's education landscape, learning environment design shapes students' experiences. Traditional classrooms, with rigid structures and teacher-focused instruction, are giving way to innovative learning environments (ILEs). These new spaces promote flexibility, collaboration, and student-centered learning. This article examines how architecture relates to pedagogy, focusing on ILEs and their alignment with 21st-century educational goals.

The Evolution of School Architecture

School buildings have historically supported teacher-centered instruction, emphasizing traditional teaching methods. But, global trends are shifting toward innovative and flexible learning spaces. Countries such as Australia, New Zealand, and parts of northern Europe are designing new ILEs. These environments provide spatial variation, geographic freedom, and resources for students and teachers.

Defining Innovative Learning Environments (ILEs)

ILEs support diverse teaching and learning practices, moving away from traditional classrooms. Cleveland (2017) describes ILEs as "learning spaces that offer greater spatial variation, geographic freedom, and resources for students and teachers than traditional classrooms" (p. 93). These environments encourage collaborative, participatory, and agentic teaching, allowing students to actively engage in their learning.

The Importance of Space and Pedagogy

The link between space and pedagogy is vital for ILEs. Imms, Mahat, Byers, and Murphy (2018) stress that innovative space designs significantly affect teaching and learning practices. They align with Gibson's (1979) affordance theory, which highlights the relationship between the environment and the user, emphasizing how environments offer various action possibilities.

Recent Developments in ILEs

Formal schooling, as established in the 19th and early 20th centuries, focused on subject-centered curriculums and traditional classrooms. Now, the shift towards ILEs is gaining traction, driven by the need for more student-centered learning. These environments ease collaborative and participatory teaching, promoting active student engagement.

Physical Characteristics of ILEs

ILEs often feature diverse spaces, learning materials, and interactive elements. For instance, a secondary school in Sydney transformed a 1980s classroom block into an ILE. It includes interconnected learning spaces, writable surfaces, tiered seating, and booth seating. These

designs accommodate various teaching and learning modes, from large gatherings to small group work.

Understanding Affordances in ILEs

ILEs offer many learning affordances, but research shows that designers and teachers may not fully grasp these. Unlike traditional classrooms, ILEs must a deeper understanding of their pedagogical potential. An affordance-based design approach can bridge this gap, fostering a shared understanding between architects and users.

Affordance Theory in Architectural Discourse

Affordance theory is less common in architectural discussions than in psychology or technology. Still, its importance in learning environment design is gaining recognition. Heft (2001) suggests that a more affordance-focused design approach can help understand how users experience and interact with spaces. This can lead to environments that are not just well-designed but also well-used.

Applications of Affordance Theory in Architecture

Researchers in architecture and interior design have examined affordances in buildings. Beek and de Wit (2001) classified affordances into three dimensions: organismic-personal, socioeconomic, and cultural-aesthetic. Maier et al. (2015) defined direct and indirect affordances, while Kim et al. (2018) developed an affordance analysis framework for interior design. These frameworks offer insights into analyzing and applying affordances in learning environment design.

Affordance Theory in Learning Environment Design

Affordance theory has gained attention in educational facility design. Yet, its application in learning environment research remains debated, with varying interpretations. Alterator and Deed (2017) define affordances in learning environments as "aspects of an environment that enable, contribute to, or constrain the kinds of interactions that subsequently occur" (p. 2). Young et al. (2019) refine this definition, identifying 'learning environment affordances' as "qualities of the environment (space, objects, and people) which may be perceived to enable teaching and learning activities and behaviors" (p. 697).

Key Concepts in Affordance Theory

Affordance theory centers on the relationship between the environment and the user and the resulting action possibilities. Gibson (1979) pointed out that affordances exist regardless of perception, but perception is key for action. Norman (1988) introduced 'perceived affordances' in Human-Computer Interaction (HCI) design, highlighting the importance of user perception. Gaver (1991) created an affordance matrix categorizing affordances into perceptible, hidden, false, and correct rejection, offering a framework for understanding actual affordances and perceptual information.

Abilities and Intentions towards Affordances

Individuals' abilities to perceive and use affordances depend on their physical and mental capabilities. Warren's (1984) study on stair climbing found that recognizing affordances is body-scaled. For example, stair climbing ability relates to the riser height and leg length ratio. Designers should consider the scale differences between younger children and adults when creating learning spaces.

Learning to Perceive Affordances and Sociocultural Contexts

Researchers differentiate potential affordances, which may remain latent, from actualized affordances. Heft (2001) suggests that only some potential affordances are perceived and used based on individual intentions. Eleanor Gibson and Pick (2001) note that perceptual learning can help individuals discover affordances, requiring exploration and time.

Future Directions for Affordance Theory in Learning Environment Research and Practice

This literature review shows that researchers from various fields interpret affordance theory differently. Its use in learning environment research faces uncertainty. Although Gibson's theory has gained attention recently, discussions about its suitable application in learning environment research remain limited.

Case Study: Stapaskoli, Iceland

Stapaskoli, a school designed by ARKÍS and opened in 2020, reflects the trend towards open and flexible learning spaces. Located in a new neighborhood, it is part of a larger complex with a preschool, public library, sports facilities, and community event space. The school currently serves around 280 students.

Method

This study was a single-case post-occupancy evaluation of Stapaskoli. Four data types informed the results:

- **Documents**: Reports, announcements, technical drawings, and texts from architects.
- **Photography**: Images from field visits and local media.
- **Interviews**: Conversations with an architect and the school director.
- **Pedagogical Walk-Throughs**: Focus groups reviewed the physical environment's strengths and weaknesses from a pedagogical perspective.

Results

Results are presented in three main parts:

- **Political and Pedagogical Intentions**: The political aim was to create a school and community center for a new neighborhood. Pedagogical intentions were somewhat vague but reflected the vision of a school as a community hub, with classrooms as central to learning.

- **Design Features and Architectural Intentions**: The design sought to create an open and flexible environment that supports teamwork and variable learning conditions.
- **Strengths and Weaknesses**: Participants noted that the variety of spaces and furniture enabling student choice in learning conditions was a significant strength.