การปรับปรุงพื้นที่การเรียนรู้ภายในโรงเรียนอนุบาลผ่าน 7 ชั้นเชิงพื้นที่ : กรณีศึกษาของโรงเรียนอนุบาลในนครโฮจิมินท์ ประเทศเวียดนาม

Improving Interior Learning Spaces in Preschool Through 7 Spatial Layers: A Case Study of The Creative Kid Preschool in HCMC, Vietnam

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An Nguyen Thi Tam เอกชาติ จันอุไรรัตน์ วีรวัฒน์ ศิริเวสมาศ
คณะมัณฑศิลป์ มหาวิทยาลัยศิลปากร
An Nguyen Thi Tam, Eakachat Joneurairatan, Veerawat Sirivesmas
Faculty of Decorative Arts, Silpakorn University
an_n@silpakorn.edu, ejeak9@gmail.com, veerawatsi@gmail.com

บทคัดย่อ

โรงเรียนเป็นหนึ่งในสื่องค์ประกอบที่สำคัญในการพัฒนามนุษย์และมีบทบาทสำคัญในการเจริญเติบโตแบบองค์รวมของเด็ก เด็กปฐมวัยใช้เวลาในพื้นที่การเรียนรู้ภายในมากกว่าในสภาพแวดล้อมอื่น ๆ โดยเฉพาะอย่างยิ่งในห้องเรียน ซึ่งเด็ก ๆ เรียนรู้ผ่านการค้นพบและสำรวจสิ่งแวดล้อมรอบตัว พื้นที่การเรียนรู้ภายในจึงส่งผลอย่างมากต่อการพัฒนาของเด็ก นักออกแบบควรตระหนักในความสำคัญขององค์ประกอบของพื้นที่การเรียนรู้ภายในสำหรับเด็กปฐมวัย วัตถุประสงค์หลักของการศึกษานี้คือการสำรวจว่าชั้นเชิงพื้นที่สามารถเสริมสร้างสภาพแวดล้อมการเรียนรู้ได้อย่างไรโดยการค้นหาว่าชั้นเชิงพื้นที่เหล่านี้ว่ามีอิทธิพลต่อเด็กอย่างไร บทความวิจัยนี้สร้างกรอบความคิดเชิงทฤษฎีสำหรับการออกแบบภายในของห้องเรียนอนุบาล เพื่อเน้นความสัมพันธ์ที่เชื่อมโยงกันระหว่างพื้นที่ เด็กปฐมวัย และวิธีการสอนเพื่อการออกแบบพื้นที่การเรียนรู้ บทความนี้มุ่งเน้นไปที่เด็กปฐมวัยที่มีอายุระหว่าง 3 ถึง 6 ปี โดยใช้ทฤษฎีฐานรากในการปรับพื้นที่ภายในผ่านการทบทวนวรรณกรรมและเอกสารการออกแบบ การวิเคราะห์สุนทรียศาสตร์เชิงพื้นที่เพื่อทำความเข้าใจความงามและองค์ประกอบเชิงพื้นที่ การศึกษานี้มุ่งสร้างกรอบแนวทางการออกแบบสำหรับ The Creative Kid Preschool ในโฮจิมินห์ซิตี้ ประเทศเวียดนาม โดยดำเนินการวิเคราะห์และประยุกต์ใช้ชั้นเชิงพื้นที่ภายใน 7 ชั้นเชื่อมโยงกับแนวทางปฏิบัติด้านการสอนและสนับสนุนพัฒนาการของเด็ก ผลการศึกษานี้ให้ข้อมูลเชิงลึกที่มีค่าสำหรับนักออกแบบภายใน สถาปนิก นักการศึกษา ครูอนุบาล รวมถึงผู้ปกครอง หรือผู้ที่สนใจเกี่ยวกับพื้นที่ของเด็กเพื่อให้พวกเขามีความเข้าใจที่ลึกซึ้งยิ่งขึ้นเกี่ยวกับลำดับความสำคัญของการออกแบบ สำหรับสภาพแวดล้อมการเรียนรู้ของเด็กปฐมวัย กรอบความคิดเชิงทฤษฎีของการออกแบบภายในนี้สามารถพัฒนาเป็นแนวทางเพื่อนำไปใช้งาน และเพื่อทำการศึกษาและวิจัยต่อยอดในอนาคต โดยเฉพาะดำเนินการวิจัยเพิ่มเติมเกี่ยวกับแต่ละองค์ประกอบที่อยู่ในแต่ละชั้นให้สมบูรณ์และยืดหยุ่นยิ่งขึ้นสำหรับการใช้เป็นแนวทางในการออกแบบที่ปรับเปลี่ยนไปตามปัจจัยทางสังคม วัฒนธรรม สิ่งแวดล้อม และยุคสมัย

***คำสำคัญ**: ห้องเรียนก่อนวัยเรียน ชั้นเชิงพื้นที่ภายใน พัฒนาการเด็ก*

Abstract

As one of four important elements of human development, school plays an important role in children's holistic growth. Preschool children spend most of their time in the indoor environment compared to other environments, especially, in the classroom where they learn through discovering and exploring the surrounding environment. Interior learning space, therefore, exerts a significant impact on children's developmental needs and designers should be aware of the importance of indoor spatial components for preschool children. The primary aim of this study is to explore a conceptual framework for understanding key factors in interior design for preschool classrooms in responding to children's development. The study constructs a conceptual framework for the interior design of preschool classrooms to emphasize the interconnected relationship between interior architectural space, preschool children, and pedagogy through exploring and understanding important spatial variables. The paper focuses on preschool classrooms for children from 3 to 6 years old. This paper employs grounded theory to adjust the interior spatial layers, utilizing existing literature and design documentation, and visual analysis to interpret and to analysis the spatial aesthetics and design elements. The scope of this research is to establish a framework for a pilot study that describes the existing environment of The Creative Kid Preschool in Ho Chi Minh City, Vietnam, and analyzes how the application of seven interior spatial layers links to pedagogical practices and supports children's development through observation and interviews with educators. The outcomes of this study have valuable insights for interior designers, architects, educators, and preschool teachers, and for parents who care about children's space design, providing them with a deeper understanding of the young children's learning environment. In future research, the conceptual framework of design for preschool classroom interior space and concept of 7 interior spatial layers can be a guideline for user application and it can be developed by conducting experimental methods on each variable to examine in response to children's development adapting to socio-cultural, environment and time context.

***Keywords**: preschool classroom, interior spatial layers, children's development*

Introduction

Human development is influenced by nested environments, as outlined in Bronfenbrenner's theory, includes microsystem, ecosystem, macrosystem, and chronosystem (Santrock, 2000). The microsystem including home, school/daycare, religious group, and neighborhood/play area - plays an important role in early children's development. It is presented that preschool education which is critical, forms the basis for ensuring the success of an individual (Abbasa & Othman, 2010). Schools, key component of the microsystem, foster children's development through discovery, experiences, and social interaction. Prior studies explore the correlation between learning environments and children's development, such as physical design and child behavior (Neill, 1982; Obaki, 2017), children's cognitive and social developmental behaviors (Moore, 1987 cited in Weinstein & David, 1987); Evans (2006) emphasize the quality of the physical environment is linked to positive children's learning and development; the emotional and cognitive effects of learning environments relation to children development (Arndt, 2012); Olds (1987) studies on designing children's environments suggest every element in the setting invites and engages children, stimulating children's senses and encouraging them to explore the full motoric potential of their bodies. Hence, it is crucial to conduct more in-depth research on the role and impact of interior spatial layers on children's development, particularly in preschool classrooms, with a focus on this relationship with pedagogy; using preschool spaces in Ho Chi Minh City, Vietnam (HCMC, VN), as a case study. The research question explores which interior spatial layers should be considered in the design process to support children's development and how these interior spatial layers can be enhanced.

This paper aims to explore a conceptual framework for understanding key factors in interior design for preschool classrooms in responding to children's development. Through a literature review and case study analysis of an existing preschool environment, this research identifies and proposes spatial factors for future empirical investigation. The study focuses on synthesizing these key factors into a framework for potential application, particularly for children aged 3 to 6 years, but lack of empirical evidence on their direct influence on child development. The scope of this research is to establish a framework for a pilot study that describes the existing environment of The Creative Kid Preschool in Ho Chi Minh City, Vietnam, and analyzes how the application of seven interior spatial layers links to pedagogical practices and supports children's development through observation and interviews with educators.

Literature review

Interior design of classroom and preschool children development

The permanent role of interior design is adapting three fundamental human needs, include psychological needs, emotional needs, and physiological needs (Caan, 2011). *"A well-planned, rich, and stimulating learning environment"* will promote children's learning development through interaction and engagement (Naeum, 2010). Hence, interior space design plays key role in enhancing children's developmental needs.

The stages of physical development are not similar. Children's physical development include gross motor skill and fine motor skills (Naeum, 2010). Preschool children can "*develop a sense of balance; stand, walk, and run on tiptoe; catch, throw, bounce; hop, use a variety of play equipment, walk along on balance*"; simultaneously, they can use their hands with various activities such as "*build a tall tower of bricks, can draw, good control of pencils and paintbrushes, writing hold is similar to the adult's*". It highlights the importance of designing learning spaces to support these motor requirements. Previous studies claimed about requirements for children's physical development, such as they have work opportunities individually or collaboratively, indoor and outdoor experiences (Department for Children, Education, Lifelong Learning and Skills, 2008); a study in learning environments with higher quality, less fixed equipment, more proper equipment, lower media use, and larger playgrounds (Dowda et al., 2009); peers interaction (Reunamo et al., 2014). Not only that, but previous studies also mentioned spatial factors that impact children's learning experiences and motor skills, such as form, color, lighting, texture, material, size, and furniture (Armanila et al., 2022). Apele and Kotāne (2021) highlighted a modern, safe, and ergonomic interior design could improve children's ability to engage in effective and creative activities, and promote children's mental and physical development. Hence, it is essential to design classroom interior spaces, where children spend the majority of their school time, and support the practice of gross motor skills, and fine motor skills of children.

Behalf of children's cognitive development, each age group has distinct ways of thinking. Piaget's theory identifies the preschool ages as part of the preoperational age (2-7 years old) (Santrock, 2000) including symbolic thought (2-4 years old) and intuitive thought (4-7 years old). In this range of ages, preschool children express their cognitive development through the development of language, symbolic thinking, imagination, pretend play, logic reasoning (Santrock, 2000), mental ordering, and classification (Oaklet, 2004). Neaum (2010) mentions indicators of preschool children's development, such as "*having a good sense of time, good observation skills through drawing, sorting with more categories, memory skills developing*", which are nurtured in the preschool environment. Consequently, classroom space plays a key role in supporting children's cognitive development. This emphasizes the close relationship between children's cognitive growth and the surrounding environment. That is "*constant process of going back and forth between the person and the environment*" (Piaget, 1929). There is a correlation between learning space and children's cognitive development (Goswami & Bryant, 2007; Liempd et al., 2019), children's emotions (Terwogt & Hoeksma, 1995), children's imagination (Goswami & Bryant, 2007), and language development (Pitchford & Mullen, 2005); interior spatial elements impact on children's behavior (Read & Upington, 2009); color, forms, and shapes (An et al., 2023) and space layout, spatial forming with lines, form, space, light, color, and texture (Rifmasari & Neviyarni, 2023) impact children's cognitive development.

All aspects of children's development are interrelated (Naeum, 2010), the three types of development— physical, cognitive, and social-emotional —contribute to children's holistic development. (Timmons et al., 2007) indicates physical activities are important for preschool children's physical, cognitive, emotional, and social development; or socio-interactions can stimulate their cognitive development

(Dzainudin et al., 2018). Developing young children's social skills could enhance their cognitive skills (Dzainudin et al., 2018). Socio-emotional development is about how children learn about themselves, what they are feeling, and what to expect while interacting with others (Naeum, 2010). It is claimed that there is a relationship between spatial arrangement and peer interaction as well as teacher-children interaction (Liempd et al., 2019); children's social interactions and relationships with their peers, practitioners (teachers, classroom assistants, staff...), and adults (Department for Children, Education, Lifelong Learning and Skills, 2008). Socio-emotional development of preschool children is expressed through "*they are sociable and talkative to adults and peers, confident and self-assured, play with group of children, engage in elaborate and prolonged imaginative play, enjoy cooperative group play, develop a stable picture of themselves*" (Naeum, 2010). At this stage, children may require space for collaborative activities, while also needing private areas for individual time, which can be supported by well-organized spatial layout.

Interior design of classroom and pedagogy

One of the key factors in designing interior classroom space is to consider what type of activities will take place within. These activities are fundamentally tied to pedagogy, encompass the curriculum, teaching methods, and daily practices employed in teaching and learning. Different pedagogy can lead to some differences in design (Anıktar & Aytuğ, 2016). "*The closer fit between interior design and the daily routines and practices of children and teachers the greater the pedagogical advantage*" (Frith, 2015). There is a close alignment between pedagogy and interior classroom space due to its influences on children's behavior and social interactions (Mendez & Özdamar, 2019), effective classroom layout enhances pedagogical options (Ford, 2016); enhance the relationship between teachers' practice and the environment (Martin, 2002); help school communities are more successful in achieving sustainable cultural change (Frith, 2015); supporting the educational process (Kaup et al., 2013); spatial organization, size, shapes, and furniture layout serve as the substance (matter) that expresses the pedagogy (ideas) (Brukštutė, 2019). Variations in pedagogical approaches can result in different preschool environment settings. In pedagogy, the content of curriculums and the role of teachers is important. Teachers rethink their role as educators in evaluating and enhancing the flow of children's motor development (Reunamo et al., 2014). Hence, in the design framework of interior classroom, pedagogy should be considered as one of three key domains.

Children's development and pedagogy

It is indicated that pedagogy influences children's development (Sevey, 2010), children's psychological development (Gentaz & Richard, 2022), children's learning and development (Manovska, 2020); children's cognitive abilities (Siying Liu, 2023). Different pedagogies employ varying teaching and learning methods; however, most early childhood education approaches focus on supporting children's development and enhancing their learning outcomes through shaping children's school readiness and the relationship between teacher-peer and children's socio-emotional development (Williford et al., 2013), such as play-based learning (Pyle & Danniels, 2017); Montessori pedagogy enhance children's cognitive and social development (Lillard et al., 2017); Reggio Emilia pedagogy supports both teachers and children's learning (Su & Edwards, 2016). In Vietnam, there are two main preschool systems, public preschools and

private preschools. Private preschools follow international curriculums and teaching methods, public preschools follow national curriculum and teaching methods. Which, the national pedagogy focuses on children's development, toward "Building a child-centered preschool in the 2021-2025 period", more precisely, the main goal in 2022-2023 is "Building a green - safe - friendly preschool" (MOET, 2022). In this document (4216/BGDĐT-GDMN), the Ministry claimed that: "*The indoor and outdoor physical environments within the classroom should be designed on taking into consideration the specific conditions of the setting.* Consequently, this paper proposes a conceptual framework for preschool classroom interior design comprising three key components: children's development, interior design elements and principles, and pedagogy. In this model, classroom design is shaped by other key domains. Thus, spatial variables must be restructured into various layers to guide the design process.

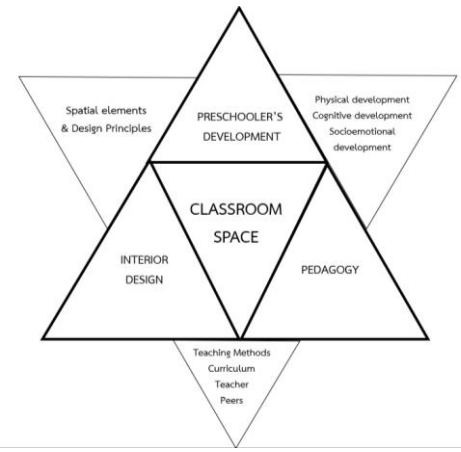

Figure 1: The conceptual framework for the interior design of preschool classroom. Source: By author

The adjustment of variables within interior space into spatial collaborative layers

Ideas of layers in space or building is mentioned in some previous studies. Pushkar & Shaviv (2014) mentioned a building in terms of six shearing layers which was invented by Duffy (1990) (cited in Carmona & Tiesdell, 2007) with four layers (Shell, Services, Scenery, and Set) and further developed by Brand (1994 cited in Carmona & Tiesdell, 2007) with six layers (Site, Structure, Skin, Service, Space plan, Stuff) (Brand, 2007). This model has been cited in recent years by researchers concerned with the development of design theory in area of ecological design and construction ecology (Graham, 2005). The concept of layers helps buildings in construction and architecture be analyzed and further understood to develop or renovate according to different design goals. However, few studies analyze how many spatial layers exist in interiors, how they function, or what they are. Designers and architects need a deeper understanding of spatial layers and their components.

Caan (2011) said that interior space is as much a psychological projection as it is a physical one. The second is how the intentional shaping of the environment – that is, by design – can affect the person occupying the space. Certainly, within four walls lie many intriguing elements, just as numerous layers within ourselves that may overlap. Consequently, interior design does not view separate components in isolation; instead, it sees them as interconnected parts that collaborate and interact to create multifaceted layers

within a space. (Boettger, 2014) has delineated a clearer concept through the identification of "five parameters" in interior architectural space. In his book, Till Boettger categorizes and re-arranges the afore mentioned elements into five factors. Based on the characteristics of space, these components are large and complex. The interior contains its own systems that mimic that of ecology with elements such as surface, color, furniture, objects, proximities, private interiors, public interiors, threshold of interior and exterior (Weinthal, 2010); design vocabulary and design elements, more specific, interior design vocabularies include form, shape, color, texture, light, proportion, scale, balance, harmony, unity and variety, rhythm, and emphasis; lighting and acoustics, finish materials and furnishings (Ching & Binggeli, 2018); space (proportion of space, type of room), surface (color, material, finishing, texture, pattern), environments (light, invisible systems), elements (furniture, display) (Grimley & Love, 2018); space, color, light, material and furniture (Kilmer, R. & Kilmer, W.O., 2014). (Table 1)

Table 1: Concept of elements of interior space. Source: By author

Authors	Definition of Elements in Interior Architectural Space
Duffy (1990 cited in Carmona & Tiesdell, 2007)	Four layers in building construction. Shell, Services, Scenery, and Set
Brand (1994)	Space plan (Internal partitions, ceilings, finishes, built-in furniture). Stuff (Furniture, consumer goods, food, waste), the concept of 6 layers in building construction.
Weinthal (2010)	Temporal Elements. Permanent Elements: Surface, color, furniture, objects, proximities, private interiors, public interiors, threshold of Interior and Exterior.
Caan (2011)	The Interior should be recognized as both zone of physical interaction but also one of psychological and emotional effects. Space is intimate and personal with intimate space, personal space, social distance, and public space.
Boettger (2014)	Spatial design: Material, color, light. Spatial function: Space and use Spatial definition: Objects and space. Spatial structure: Form and order Spatial sequence: Places and paths
Ching and Binggeli (2018)	Interior Architecture: form, organization, circulation, proportion & scale Interior building elements: ceilings, windows and doorways, floors, stairways, and walls. Interior design vocabulary: form, shape, color, texture, light, proportion, scale, balance, harmony, unity and variety, rhythm, and emphasis; lighting and acoustics, finish materials and furnishings
Grimley and Love (2018)	Space (proportion of space, type of room). Surface (color, material, finishing, texture, pattern). Environments (light, invisible systems). Elements (furniture, display)
Kilmer, R. and Kilmer, W.O. (2014)	The elements of design are space, Line, Form, Shape, Texture, and Time; The principles of design, include balance, rhythm, emphasis, proportion, scale, unity and harmony, and variety; Color, Furniture, Material

Table 1 highlights as evidence that defining spatial layers within interior space, from both architectural and interior design perspectives, can be complex and overlapping. To clarify this for design and analysis, this paper develops the concept of interior spatial layers. They are categorized based on synthesis, analysis,

and filtration of the literature reviewed, and could be seen as a unified body. As earlier frameworks, such as Duffy's 4 layers (1990 cited in Carmona & Tiesdell, 2007), and Brand's 6 layers (1994), primarily focus on ecological design and building construction, this paper narrows the scope to interior space. The propose "7 Interior spatial layers", as a systematic structure to enhance understanding of interior space and the human body through variables of each layer facilitating their application in the interior design process. The reason for choosing 7 layers is based on some cognitive and design theories, as the number 7 is the magic number that can help balance between too few and too much to remember (George Miller's theory) (Miller, 1956); significant in human cognition, which can hold in human memory (Raymond & Healy, 2017). Additionally, there are some studies emphasize the relationship between the number 7 human and design, such as research by (Ambrosi-Randić et al., 2005) mentions about number 7 and human body size assessment; in socio-technical context, a seven-layer model has been used to reduce cognitive loading, improving the completeness and consistency of their designs and yielding higher productivity for collaborative groups (Briggs et al., 2009). These insights suggest that a framework based on 7 layers can offer as a robust choice for adjustment of interior design elements in preschool environments

Concept of 7 interior spatial layers in preschool classroom space.

The concept of the seven interior spatial layers was developed by systematically arranging and categorizing various functional elements within the preschool classroom space, each of which influences young children's development. They are spatial function, spatial form, spatial order, spatial color; spatial material, spatial furniture; in which, each layer will have specific component that needs to be focused on. (Figure 2)

Spatial function: about space and use, as it places the emphasis on the use of the space, includes considerations of physical shape, structure, configuration, volume, mass, scale, arrangement of architectural features, and spatial organization. It's about how the space is utilized and the interactions it facilitates. The key components of these layers could include factors such as density – the number of preschool children in a classroom (Burgess & Fordyce, 1989; Maxwell, 2003), spatial boundaries, interior spatial organization such as modified plan for preschool classroom (Weinstein & David, 1987), interior architectural elements such as doors, windows, stairs, partitions (Ching & Binggeli, 2018). Spatial functions may determine the traffic flow within an interior space, which can impact children's movement and, in turn, influence their physical development

Spatial form: pertains to the overarching shape, structure, and contour of the interior space. It encompasses both internal and external aspects of the space and the principles that establish coherence and unity in the overall design. Analyzing this layer involves understanding the characteristics of elements in interior design, such as point, line, shape, and volume, and their impacts on young children's experience within the space. Combined with the components of spatial order, form and order create areas of solid and void within the space, where young children move and interact, influencing both their physical movement and visual experience.

Spatial order: the arrangement, organization, and hierarchy of elements within the interior space. Interior spatial order deals with the way components are structured and positioned to create a sense of balance, harmony, and functionality. Spatial order can be based on key components such as proportion, scale, balance, rhythm, emphasis, unity and harmony, and variety, which are principles of design used to create an ordered arrangement in space. According to Ching and Binggeli (2018), "*interior design involves the selection of interior design elements and their arrangement within a spatial enclosure to satisfy functional and aesthetic requirements. This arrangement of elements in a space involves pattern making*." Combination and arrangement of space according to these layers can create solid and void areas for children's spatial experiences which impact children's physical skills day by day.

Spatial color: about color use within interior environment, includes color theme selection, color palettes for space, and application color design within interior space. Color is one of the important factors in the human environment (Huseynova, 2021) because of its effects on various human life aspects. Pitchford and Mullen (2005) suggested a link between color preferences and the development of children's language and color perception. It can serve as a powerful tool for symbolic representation impact on children's cognitive development (Cameron et al., 1993). It is indicated that applying children's preferred colors, such as red, purple (Read & Upington, 2009) or pink, blue, or yellow (Read & Upington, 2009) into learning interior spaces can foster the feeling of stable and refresh, promoting calmness and relaxation for children.

Spatial material: finishing materials used on the texture of interior architectural elements surfaces, decorative items, and furnishing within interior spaces; including considerations of texture, patterns, durability, aesthetics, and suitability for the intended use. The layer of spatial materials is complicated and challenging with designers throughout the process of interior design, play a significant role in creating the desired atmosphere in an interior environment. A room could technically function without color or finished materials, the absence of such elements might leave the interior space feeling incomplete and uninviting.

Spatial furniture: involves the selection, arrangement, and placement of furniture within the interior space, including considerations of scale, proportion, functionality, and ergonomic design to ensure comfort and usability. Furniture could be considered a difficult task in designing spaces because of the character's complications. children spend 70% of their time in school, constant interaction with peers, objects, and furniture (Waldron et al., 2014). Furniture should be evolving into meaning more profound - a catalyst for thought and imagination, still keeping safety for children, which serves as an invitation to think and dream, beckoning forth possible ideas and half-formed notions (Taylor & Preston, 2006 cited in Izadpanah, 2011).

Spatial environment: This layer encompasses the overall ambiance, sense of place, and sensory experience within the interior space, including essential factors in preschool classrooms such as lighting (Weinstein & David, 1987), temperature, air quality, noise levels (Bulunuz et al., 2017; Weinstein & David, 1987) and other factors that contribute to the atmosphere or mood of the space" (Olds, 1987).

In this context, selecting the primary factors to emphasize in interior space or determining how many layers to combine becomes more flexible and straightforward. Layers are not only combined to create a unified

space but also exist as individual components. Designers can refer to the 7 layers and choose two or three of them to renovate or to do new designs, based on specific site design conditions in real design projects.

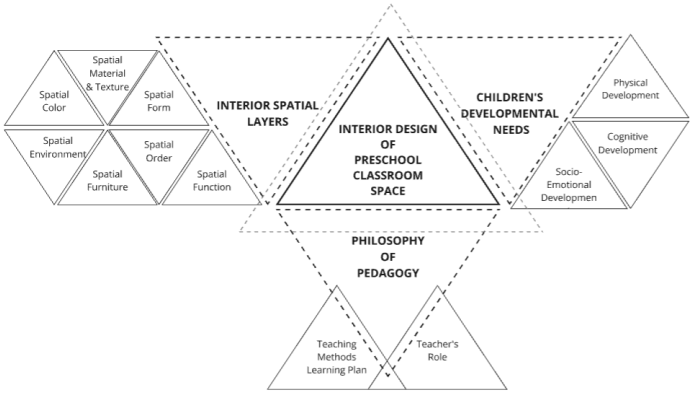

Figure 2: Conceptual Framework for Interior Design of Preschool Classroom Space. Source: By author

Analysis case study through the concept of 7 indoor spatial layers.

To analyze how 7 interior spatial layers are applied in the interior space of preschool, the author went to Creative Children Preschool (Figure 3)., located at 461 Ha Huy Giap Street, District 12, HCMC. The pedagogy of this preschool is combination of Montessori, Steam, Emotional Intelligence, and national curriculum, with five main principles in nurturing focus on "*teacher-children-peer interaction, socio-emotional ability, play based learning, place belonging and becoming, school and parent collaboration*" (Preschool, (n.d.)). Classroom observations, site checks, photographic documentation, and visual analysis were conducted to discover and observe the design of 7 interior spatial layers within preschool classrooms and their functional impacts on children's activities through interaction, linked to their pedagogy (Table 2). Data were collected through the author's observation of space, visual analysis, and interviews with teachers.

3a

3b

3c

3d

3e

3f

Figure 3: The interior design spaces of Creative Children Preschool, HCMC, VN. Source: By author

The reception area and main lobby (Figure 3a-3b) are designed to be large, providing space for movement, for dropping off children in the morning and picking them up in the afternoon (as shared by teachers during interviews). It is like a social space for children social's activities. Wide areas of preschool lead to the benefits for classroom interior space is located in a good area, face to face with other classrooms with a center long

corridor connecting all classes. Each classroom has big windows (Figure 2e) with a low density with around 20-22 children per class, providing enough space for all functional areas within one classroom. Emphasis composition in space is designed with a focus on the reception area as a focal point and creates traffic flow. Functional rooms are located in separate rooms, including kitchen and eating rooms, dance class, art class, and pretend play class which helps children have their own space for learning and sleeping activities. Moving from the classroom to other specific areas promotes a child to move their body and make some social connections. The color palette of this preschool is light, featuring shades like beige and natural wood derived from wood materials. Wood is the main finishing material in the space (Figure 3).

Table 2: Analysis board of design of 7 interior spatial layers in the preschool classroom. Source: By author

Seven interior spatial layers		Design features	Observed Functional Impacts
Spatial Function	Density	15 – 20 children per classroom	Low density
	Boundaries	Visual boundaries: color cues, material, Physical boundary: glass doors and windows, solid walls. Colorful partition in the toilet area. Pull-down curtains	Safe for children, creates clear spatial distinction, stimulates both physical and visual experience
	Interior Floor Plan	Modified Open plan The toilet is shared for two class	Flexible layout plans for teaching, and learning activities. Children can work independently and easy to collaborate.
	Interior Zone	Long corridor Sleeping, and general learning activities, take place in the same space, and furniture will be arranged based on the time of day.	Help to promote social activities among children in different classes. The classroom is clean and free of any bad odors. Good connection between indoors and outdoors.
	Interior Architectural Elements	Glassdoor and Large horizontal window. Solid walls, not much decoration, tiled on the wall up to 900mm walls. No mobile partitions	Easy observation. Be safe for children, create good ventilation => support for children's physical movements
Spatial Form		Rectangle form and straight lines. Perpendicular space	Creating the sense of feeling of clean and clear in space.
Spatial Order		Connective corridor Front-facing classrooms	To create a connection between classrooms -> support social interaction
Spatial Color		Use a neutral palette: beige, white, bright grey, natural color wood color. Key color: Blue-Green	Controlled color stimulation. Bring to sense of natural feeling, promote children's emotion in space
Spatial Material		Wood chairs, tables, and shelves. Wood flooring	Safe, but not overly complex to hinder discover
Spatial Furniture		Children's size chart. Lightweight	Safe and comfortable. Not special form
Spatial Environment	Noise	Yes	In control
	Light	Have natural light from the window, and artificial light. No accent lights	Good for children's eyes and health.
	Air Condition	Equipped	Support for ventilation
	Technology	Equipped	Support for digital learning

During the site visit, the author applied the concept of 7 interior spatial layers to observe the space and analyze the preschool's design, layer by layer, component by component (through Table and Figures). This approach helps to understand the design of space and its effectiveness in linking design to pedagogy objectives and in responding to children's development.

Discussion

The physical school environment as the child's third teacher, alongside teachers and parents (Wilson & Ellis, 2009). Classroom interior space could be seen as "fourth teacher", guiding children and promoting positive lifestyles. The "fourth teacher" should be constructed by combination of three key domains – 7 spatial interior layers, children's developmental needs – pedagogy- to optimize their role. The concept of 7 interior spatial layers provides detailed key components that significantly influence children, helping designer deepen their understanding and align designs with children's development needs and pedagogical philosophies. In the scope, this paper primarily reviews the literature and develops the research framework, identifying variables for future data collection to address the research objectives. It also tries to explore this concept by analyzing the existing preschool environment. Based on that, the research identifies and proposes spatial factors for future empirical investigation.

Due to time and space limitations and permission acceptance, there is a lack of experimental evidence to demonstrate the influences of the '7 interior spatial layers' on children's development. While data collection in the case study was conducted through observation of space, visual analysis, and interviews with teachers, the absence of an interior floor plan in case study is another limitation. Future research should incorporate a detailed floor plan to better examine the layers of spatial function and spatial order. Future research should incorporate more empirical studies and use the Post-Occupancy Evaluation (POE) method to collect direct data from children and test the applicability of this paper's framework.

Conclusion

Early childhood is not only the most important stage of children's development but also a period of growth for their cognition, inner emotions, and thinking abilities. The learning environment must be designed to support functionality and nurture children's development. This study has reviewed relevant literature, developed a research framework, and identified variables for future data collection. The paper concludes by summarizing the literature and reporting on issues found in the case study, with the discussion focusing on the literature review and framework. The conceptual framework for the interior design of preschool classroom space could be further developed by conducting in-depth research into each of the 7 spatial layers by fragmenting and examining each layer individually.

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