Available online at
http://journal.uitm.edu.my/ojs/index.php/BEJ

e-ISSN: 2637-0395

Built Environment Journal 22(2) 2025, 44 – 62.

Built Environment Journal

Spatial Design Strategies for Preschools with Learning Through Play (LTP) Approach

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ARTICLE INFO

Article history:
Received 09 April 2024
Revised 27 August 2024
Accepted 07 October 2024
Online first
Published 01 July 2025

Keywords:
LTP (Learning Through Play)
Preschool
Montessori
Quality Spatial Design

DOI:
10.24191/bej.v22i2.1359

ABSTRACT

Learning Through Play (LTP) is a play-based curriculum which is inextricably linked to the early childhood education (ECE) system. This approach has a beneficial influence on children's holistic learning and develop of various skills. Throughout Montessori history, the Montessori classroom is often associated with playful learning. A high-quality preschool with thoughtful spatial design is crucial to support LTP approach which would give children autonomy to learn, play, explore and experience a variety of activities to enhance their immediate developmental goals. However, several research indicates the LTP is not yet fully integrated into formal Malaysian preschools which is hindered by inadequate spatial design. Besides, there are also gaps in policy and guidance to employ LTP effectively where the workforce's training and curriculum development are mainly concerned. Therefore, the learning environment in Malaysian preschools are unable to contributes positively towards enhancing children's development and wellbeing. This research employs case study approach to evaluate how the spatial design of the prominent Montessori preschool supports LTP with data collection through document analysis and observation. The findings are then analysed using comparative analysis based on the key aspects of spatial design elements: - aesthetic of space; anthropometric design; variety of spaces; layout and circulation; and outdoor access., which are grounded in Gibson's Theory of Affordance. The findings emphasise the significance of incorporating nature-inspired colour schemes into preschool learning environments. Open-plan layouts with flexibility and accessibility create a variety of spaces that support diverse dynamic activity areas. Child-scaled furniture, accessible elements, and seamless integration of indoor and outdoor environments effectively support learning through play (LTP), fostering a stimulating and engaging preschool experience for children. This study provides valuable insights for designers, educators, and policymakers to improve the quality of learning

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https://doi.org/10.24191/bej.v22i2.1359

spaces in Malaysian preschools and promote LTP-based curricula for Malaysia's future education.

INTRODUCTION

Learn Though Play (LTP) has become one of the main child-centred pedagogy in Early Childhood Education (ECE). As stated by Little & Wyver (2008), 'within the early childhood field, play has long been acknowledged as an important context for children's learning and development. Play is a significant aspect of children's lives, reflecting their social and cultural contexts' (Bakar et al., 2015). Indeed, play and learning are inextricably linked where play is a powerful learning mode that integrates children's experiences, knowledge, and representations (Gray, 2017) to promote academic, socio-emotional, and cognitive development. Evidently, Montessori pedagogy shares the ideology of play-based learning, has demonstrated positive outcome in enhancing children's attitude towards learning, self-developing in their own individual pace in a joyful, independent, and confidence manner.

The quality of the built environment in preschools is one of the critical challenges in the 2030 Agenda for Sustainable Development Goals (SDG) set by the United Nations in relation to SDG Goal 4: Quality Education. Emerging evidence has proven that the children's developmental trajectory influenced by schooling and built environment features (Collyer et al., 2022; Zhang & Li, 2012). The most important is, play must be supported by the environment (Zosh et al., 2017). Space design of preschool plays a dominant role in the successful delivery of LTP. Montessori believes that a well-designed environment has been deemed essential to the educational process will enhance the children's learning and development (Yalçin, 2018). Indeed, Montessori is putting effort and careful in preparing the space design.

Presently there is a significant gap in the design guidance that governs the planning framework for the spatial design of ECE in Malaysia (Rahmatullah et al., 2021; Lim, & Bahauddin, 2019; Shahli & Akasah, 2019). The only guideline in the Garis Panduan Perancangan Dan Penubuhan Tadika dan Taska (2017) merely stipulates a minimum requirement of 15 ft2 (1.4 m2) per child and a general directive to follow universal design principles (PlanMalaysia, 2017). National Standard Preschool Curriculum (NSPC) also doesn't delve into detailed guidance on space management to facilitate teaching and learning activities. Moreover, the Ministry of Education (MOE) as the policymaker of preschools, has mainly emphasised on the development of curriculum rather than the spatial quality (Saleh et al., 2018). As a result, the ECE facilities are hindered from creating learning environments that facilitate and encourage LTP, thereby jeopardising children's physical, social, emotional, and cognitive growth in a holistic manner.

By closely examining these Montessori preschool model's spatial design, this paper aims to offers a replicable blueprint that may serve as a guiding framework to help Malaysian preschools foster joyful, impactful learning environment that seamlessly integrate LTP as a core pedagogical approach. To gain a comprehensive understanding of the above, this study is divided into four (4) key sections as follow. First, significant of LTP for children's development is highlighted. Secondly, the implementation of LTP in Montessori Education is examined; then the role of Gibson's Theory of Affordance in quality learning space for LTP is discussed; and finally, the quality learning spaces for LTP implication in preschool is elucidated in the following literature.

https://doi.org/10.24191/bej.v22i2.1359

LITERATURE REVIEW

Children's Play and LTP

Play is never trivial, and it isn't just for fun. Over forty years, play has been indicated to have enormous benefits offers to the children (Van Dijk-Wesselius et al., 2022; Pyle & Bigelow, 2014). One of the world's best known Greek philosopher, Plato said that, "Our children from their earliest years must take part in all the more lawful forms of play, for if they are not surrounded with such an atmosphere they can never grow up to be well conducted and virtuous citizens." (Hirsh-Pasek & Golinkoff, 2008). Through play, the children are able to explore, experiment, learn and create skills and knowledge during play to enhance their development (UNICEF, 2018; Yogman et al., 2018; Zamani, 2014; Vygotsky, 1967; Piaget, 2013).

Indeed, play and learning are intricately connected. Play serves as important educational role during the childhood and it has been recognised as the beneficial fundamental 'field of experience' for the children in developing knowledge and skills, the major trend in ECE in the world has replaced educator-led approach to pedagogy of play as the core of preschool (Vogt et al., 2018; Baumer, 2013). In fact, play has been recognised as the utmost important element in ECE in this century where pedagogy of play is the playing-learning concept to support LTP in order to create playful experiences to the children. Doubtless, many preschools across different national contexts have started to embedding play into learning classroom. Including Malaysia, LTP has been adapted in National Preschool Curriculum Standard (NPCS) as part of the preschool curriculum in supporting the children's learning and development.

Fundamentally, play must be supported by the environment (Zosh et al., 2017). Environment will powerfully influence the children's play and development (Sando, 2021; Nedovic & Morrissey, 2013). Preschools serve as a pivotal role in the modern setting and has become a vital integral robust and good place to serve as a playing field in order to have the LTP. Nevertheless, according to Badzis (2006), a well-designed preschool should not be just built based on the satisfaction of adult users but also address the children's needs and preferences, to enhance their developmental opportunities. In order to design a quality play space that cater to children's need and to foster positive play and learning experiences and engagement, children's perception is crucial where they are given decision-making powers as they are the main users and the expert in the play space (Krysiak, 2021).

Unfortunately, the current teaching and learning in ECE contradicts to the holistic development and dynamic, child-centred approach advocated in National Preschool Standard Curriculum (NPSC), where traditional and formal teaching and learning is still used widely as the main mode in ECE (Qin & Nor, 2018). Indeed, in Malaysia, preschools stakeholders, designers and related government officials are the place makers of the built environment without concerning children's preferences and needs where the spatial design is still fully controlled and arranged by the teacher-in-charge in the preschool settings. Therefore, the children's space design in preschool setting does not address the children's need and preferences in generally (Shahli & Akasah, 2019).

Consequently, it is essential to explore Montessori education to gain a deeper understanding of how LTP is effectively implemented. The following section will provide a comprehensive overview of Montessori education, serving as a foundational framework for developing the methodology indicators.

The Montessori Education Approach

Montessori education method was developed by Italian physician and educator Dr. Maria Montessori in the early 1900s. Dr. Maria believed that 'education must begin at birth' (Montessori, 1946). In the early

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twentieth century, Montessori method captured the attention of educators globally and it has become a widely recognised and implemented model for ECE around the world to support the learning and development of children (Kiran et al., 2021).

Montessori beliefs that children have an innate capacity and tendency to seek out learning through spontaneous sensory activity and self-discovery, without unnecessary interference from adults (Bahmaee et al., 2016; Lillard, 2013). It likely recognises that each child is unique, and teachers tailor the curriculum to meet the individual needs and interests of each student, ensuring that they progress at their own pace and follow their inner drives (Rathunde, 2001). The Montessori curriculum is designed to foster LTP where play is part of the integral component by integrating 'real pretend' activities that allow the children to mimic real-life situations in a joyful, stress-free way (Xiang et al., 2024). Moreover, children have the freedom to pursue their natural interests and curiosities in the classroom towards established certain learning goals where subtly guided by teachers (Lillard, 2013). This allows them to focus deeply on meaningful tasks and experience learning with joy, as Dr. Maria (1949) once stated, "The child who concentrates is immensely happy" (Kelly, 2022).

Montessori emphasises the importance of well-designed environment that can significantly support children's learning and development (Xiang et al., 2024; Yalçin, 2018). The Montessori classroom, referred to as the 'prepared environment', is structured to be child-sized with accessible materials and furniture (Xiang et al., 2024; Badiei & Sulaiman, 2014) guided by teachers to create the optimal learning environment for children and stimulate children's learning (Kiran et al., 2021). The 'prepared environment' is described as 'simple but graceful' (Al et al., 2012). The Montessori prepared environment is intentionally designed to cultivate children's sensory awareness, focus, independence, and self-discovery through hands-on, child-led activities (Xiang et al., 2024; Kiran et al., 2021; Mavrič, 2020).

Consequently, this study will employ Gibson's theory of affordance to understand the correlation between the quality of learning environment and children's play in preschool context to create a quality learning spaces to promote positive and constructive LTP approach for the children.

Spatial Affordances for Preschool Children

The Theory of Affordance by James Jerome Gibson is an ecological psychologist that illustrates the dynamic relationship exists between an individual and its environment (Chong & Proctor, 2019). Gibson asserts, 'the affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill' (Bornstein & Gibson, 1980). Essentially, this theory underscores how environment possibly offers to the individual to possess potential actions and behaviours (Xiang et al., 2024; Sando & Sandseter, 2020).

For preschool-aged children, the implications of this theory are profound. According to Gibson, affordances mean the functionally significant characteristics of environment, provides a psychological framework for analysing child-environment interactions (Xiang et al., 2024; Kyttä, 2003). Researchers often apply the theory of affordances to explore on how the children value their surrounding environment for 'playability' and perceive the functionality of the environment through their experiences and interactions (Xiang et al., 2024; Aziz & Said, 2015). Since play is a critical childhood activity, the environment should be shaped to support and encourage this engagement (Sando & Sandseter, 2020). Inarguable, literature indicates that well-defined spatial are positively influence the children's behaviours and development.

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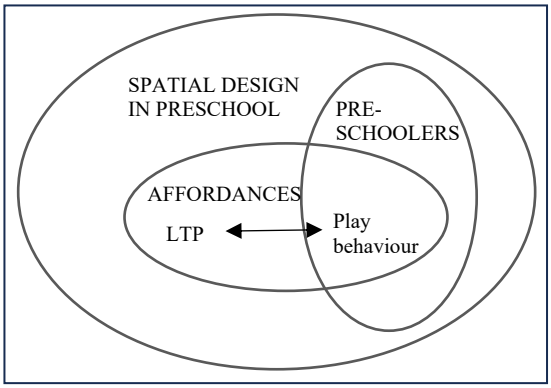

Fig. 1. Affordances for Preschoolers Take Place in Preschool Environment

Source: Author (2024)

Therefore, using the Theory of Affordance as a guiding framework, preschool should thoughtfully design learning spaces to offer rich, engaging and developmentally appropriate opportunities to support holistic development of children and fostering a positive and engaging LTP experience. The affordances children perceive and interpret based on their experiences and developmental stage shape their play behaviours and learning outcomes. In this study, Fig. 1 shows that the preschool learning environment offers potential affordances to support LTP through its spatial design characteristics. Children's actual play behaviours and engagement, influenced by their skills, interests and motivations (Lim, 2016) represent the used affordances as they actively engage with the available opportunities in the space. The following section will discuss the quality of learning spaces in preschool and outline the indicators that will be used for analysing the case study in this paper.

Quality of Learning Spaces for LTP Implication in Preschool

Space is the immediate environment surrounding human where the quality of the space affects the human's physical and psychological. Children's space refers to a space that support and affords children's activities especially play and able to develop the sense of place on children. Sense of place is important during early childhood, as it is an essential element to enhance children's cognitive, social and emotional development (Xiang et al., 2024). Through the sense of place, equipped with curiosity and five (5) senses, children are able to explore and develop certain understanding through their interaction with the surrounding environment (Brillante & Mankiw, 2015) and also able to create and engage in a wide range of play (Sandseter et al., 2023). Renowned early childhood practitioner Anita Rui Olds (1979) emphasised that while children have an innate motivation to interact with their surroundings, the true quality and value of those interactions hinges on the engagement afforded by the environment. (Xiang et al., 2024; Altenmüller-Lewis, 2014).

However, children are more sensitive and attached to space compared to ordinary adults (Lin, 2021). Children nowadays allocate a significant portion of their day to attending and learning in school environments. It is crucial that the preschool to be thoughtfully designed and planned to provide a rich stimulating environment opportunity which are able to actively engage wide range of play and activities for the children (Xiang et al., 2024). Architect and designer hold a profound responsibility to craft environments that cater to the specific needs and desires of children which also can facilitate their exploration and various activities. Anita Rui Olds (1987) mentioned, "When children feel comfortable in their physical surroundings, they will venture to explore materials or events around them" (Aleksić, 2015). Nevertheless, a good quality classroom spatial design inspires, and encourages children to experience

https://doi.org/10.24191/bej.v22i2.1359

various LTP experiences. Alternatively, poor quality spatial design in preschools may affect children's behaviour and development.

Table 1. Five Aspects of Spatial Design Elements

Spatial Design Elements	Descriptions
Aesthetic of Space	Refers to visually stimulating, with varied forms, textures, and colours.
Anthropometric design	Refers to the furniture and facilities that are sized appropriately for children, allowing them to easily navigate and interact with the space.
Variety of spaces	Refers to a range of areas designed to encourage and facilitate varies activities for individualised play and group activities.
Layout and circulation	Refers to easy and safe routes for children's movement.
Outdoor access	Refers to the access to the outdoor setting, and with spaces to facilitate dynamic educational activities and experience.

Source: AMI (n.d.)

There are some key architectural design elements and techniques in designing effective preschool environments. The key aspects of spatial design elements shown in Table 1 are referred to the Montessori Architecture pattern mentioned by Association Montessori Internationale (AMI) (n.d.). These five (5) spatial designs features are - i) aesthetic of space; ii) anthropometric design; iii) variety of spaces; iv) layout and circulation; and iv) outdoor access.

The implementation of LTP in Malaysian preschools is hindered due to the unsupportive physical environment (Xiang et al., 2024; Lim & Bahauddin, 2017). Therefore, the case study of a successful Montessori preschool is examined at the following section to demonstrate how quality spatial design can effectively support the implementation of LTP, providing valuable insights for improving the physical learning environments in Malaysian preschools.

METHODOLOGY

This study employed two (2) case studies under qualitative methods, utilising interpretivism to conduct in-depth spatial design analyses of a Montessori preschool globally and a Malaysian public preschool. Spatial narrative guided the selection of the indicators, while hermeneutics approach is applied theoretically to create a systematic framework for reading and analysing the spatial design elements of the preschool, aiming to develop a better spatial design framework in preschool. Through this approach, researchers can understand the social phenomenon social phenomena, process data, and answer key questions by examining documents, books, and other sources.

On the other hand, document analysis and direct observation are used as data collection methods on the selected case studies. Yin's (2018) explanation building analytic technique was used to explain the causes and outcomes of the phenomenon under study (Xiang et al., 2024). The comparative analysis of the case studies provided a replicable blueprint serves as a guiding framework to help Malaysian preschools enhance children's play behaviour through quality spatial design.

The justification for selecting My Montessori Garden Preschool and Tabika KEMAS Keramat Nur Parlimen Titiwangsa as case studies refers to four (4) criteria shown in Table 2.

https://doi.org/10.24191/bej.v22i2.1359

Table 2. Criteria of the Case Studies

Criteria	Descriptions
Building Structure	Both preschools are single-story buildings with ample outdoor spaces.
Location	Both are urban preschools located in residential areas.
Built-up Area and Capacity	Comparable built-up areas ranging from 250-350 m², accommodating approximately 50-55 children.
Educational Approach	Both preschools adopt the LTP approach.

Source: Authors (2024)

Moreover, the Tabika KEMAS represents the largest network of preschools in Malaysia which consists of 8,387 nationwide (Portal Rasmi Jabatan Kemajuan Masyarakat (KEMAS), 2024). It is a public preschool system where the curriculum and programme follow the NPSC and accredited by the Ministry of Education (MOE) for ECE. Tabika KEMAS Keramat Nur Parlimen Titiwangsa was chosen as the case study because it is the only Tabika in the Kuala Lumpur with a STREAM-focused module as play-based learning approach, and its specialised facilities and layout are intended to serve as a pilot model to be implemented to all preschools nationwide (Portal Rasmi Jabatan Kemajuan Masyarakat (KEMAS), 2024).

RESULTS

In this section, the background of the two (2) case studies and the findings based on the data collection from text and documents will be described as follow:

Case Study 1: My Montessori Garden Preschool

My Montessori Garden Preschool is a Montessori-oriented private preschool located in a residential area of Ha Long City, Quang Ninh, one of the fastest-growing cities in Vietnam. Designed by HGAA Architects, the preschool was established in 2020 with a built-up area of 340m^2 and capacity for 55 students. This preschool is designed as a one-story building with an upper walkway, using a simple steel structure for easy dismantling and relocating in the future. The classrooms are in two (2) blocks of steel-framed design, surrounded by gardens to create a natural space and effective learning environment for children (Archdaily, 2024; Xiang et al., 2024).

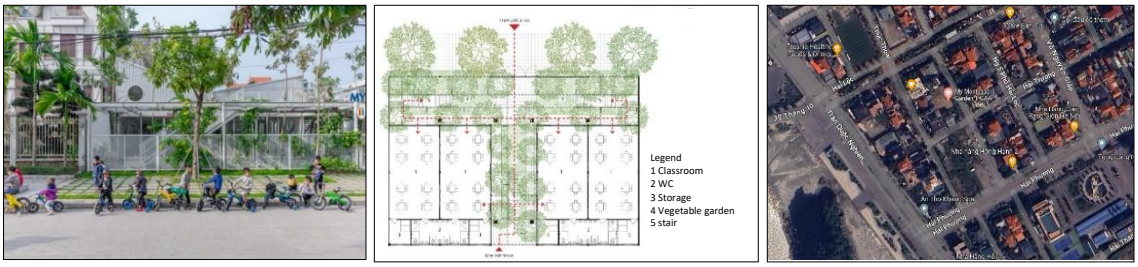

Fig. 2. (Left) My Montessori Garden Preschool; (Middle) Layout Plan; (Right) Map Location

Source: Archdaily (2024); Google Map (2024)

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Case study 2: Tabika KEMAS Keramat Nur Parlimen Titiwangsa

Tabika KEMAS Keramat Nur Parlimen Titiwangsa is a public preschool located in a residential area of Kampung Datuk Keramat in Kuala Lumpur. It has a total build-up area of 290m^2 and a capacity of 42 students. The preschool was initially established through the adaptive reuse of a vacant multipurpose hall. In 2018, it was redesigned as a single complex type of preschool (Tabika Sesebuah) and single-story building on the proprietary site of Ministry of Rural Development (KEMAS), under the purview of the KEMAS.

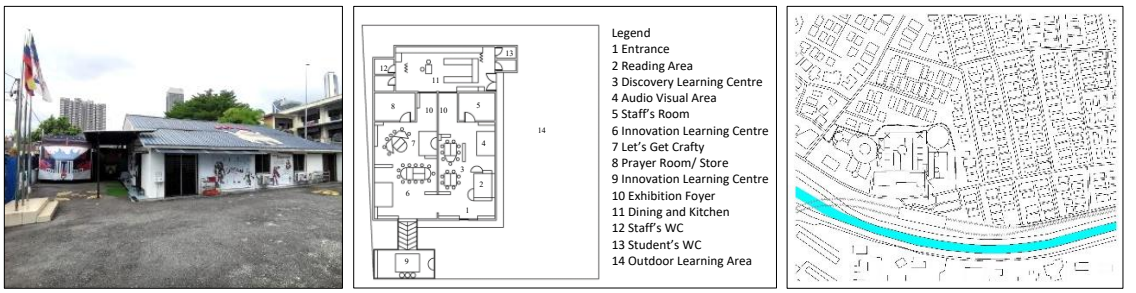


Fig. 3. (Left) Tabika KEMAS Keramat Nur Parlimen Titiwangsa; (Middle) Layout Plan; (Right) Location Plan

Source: Author (2024); Xiang et al. (2024)

The findings (Table 3) are described with the key features of articulate space and form as mentioned earlier, which are the:

(i) Aesthetic of space

(ii) Anthropometric design

(iii) Variety of spaces

(iv) Layout and circulation

(v) Outdoor access

Table 3. The Findings of Spatial Design Features Between Case Studies

Spatial Design Elements	**Case Studies**	
	My Montessori Garden Preschool	**Tabika KEMAS Keramat Nur Parlimen Titiwangsa**

Aesthetic of Space	Used of a palette of soft, natural colours on the walls and furnishings in the classroom for a soothing and inviting atmosphere. The furniture, shelves, and learning materials are made of natural wood and those learning materials are neatly arranged on low, accessible shelves.   Fig. 4. Aesthetic of Space in My Montessori Garden Preschool Source: Archdaily (2024)	Used of the white dominant walls complemented by the incorporation of blue-themed wallpaper on select walls. The contrast between the calming white backdrop and the vibrant blue accents helps to boost children's creativity and create visual interest.   Fig. 5. Aesthetic of Space in Tabika KEMAS Keramat Nur Parlimen Titiwangsa Source: Xiang et al. (2024)
Anthropometric design	The furniture and facilities, including tables, chairs and low-rise shelves, are specifically scaled to the children's ergonomic and anthropometric measurements. The play, teaching, and learning materials are strategically placed within easy reach of the children which are neatly organised and stored on shelves, in cubbies, and other accessible storage units.   Fig. 6. Furniture and Facilities Arrangement in My Montessori Garden Preschool Source: Archdaily (2024)	All the furniture and facilities, including tables, chairs, and low-rise shelves, are scaled to the children's ergonomic and anthropometric measurements, ensuring a comfortable, age-appropriate fit. The play, teaching, and learning materials are strategically placed within easy reach of the children. These resources are neatly organised and stored on shelves, in cubbies, and other accessible storage units.   Fig. 7. Furniture and Facilities Arrangement in Tabika KEMAS Keramat Nur Parlimen Titiwangsa Source: Xiang et al. (2024)

Variety of spaces

The classrooms are designed with an open-plan layout. The glass sliding doors, low-height furniture and furnishings create soft partitions, delineating different learning spaces to cater to the children's diverse needs and activities.

Fig. 8. Variety of Spaces in My Montessori Garden Preschool

Source: Archdaily, 2024

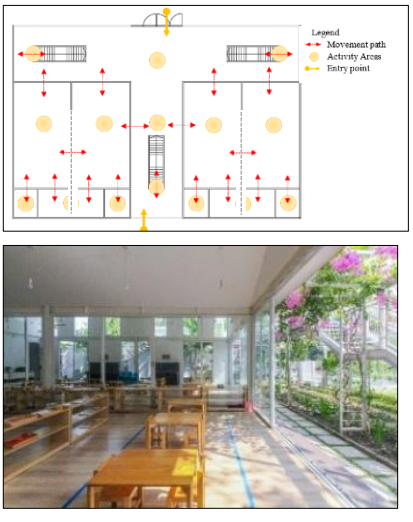
Spaces are primarily occupied by fixed features and furnishings, each with a designated function for specific teaching, learning and play activities. This rigid, compartmentalised approach can limit the affordances. Children often sitting or standing around tables, engaging with small toys and materials or reading and drawing.

Fig. 9. Variety of Spaces in Tabika KEMAS Keramat Nur Parlimen Titiwangsa

Source: Author (2024)

Layout and circulation

The ‘adjacent spaces’ of the preschool is carefully crafted to create a sense of openness and flow. The open-plan layout with uncluttered design clearly defined pathways guide children through the various activity areas. Moreover, the seamless integration of indoor and outdoor spaces and the ground to the top encourages children to forge a strong movement around the school.



The spatial organisation depicts ‘adjacent spaces,’ yet with cluttered layouts. These areas are rigidly partitioned into two (2) distinct learning zones with wall partitions. Each of these learning spaces is further subdivided into smaller, disconnected sections by fixed features and furnishings. This fixed furniture takes up a significant amount of floor space and leaves little room for flexible circulation.

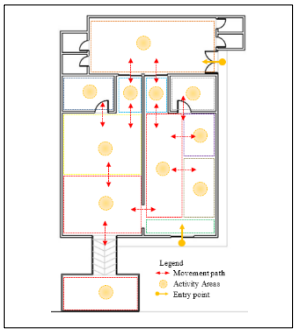


Fig. 10. Layout and Circulation in My Montessori Garden Preschool

Source: Xiang et al. (2024); Archdaily (2024)

Fig. 11. Layout and Circulation in Tabika KEMAS Keramat Nur Parlimen Titiwangsa

Source: Xiang et al. (2024)

Outdoor access

Children are freely access from the classroom to the outdoor garden as the outdoor learning spaces seamlessly connected to indoor areas through transitional spaces like terraces or verandas. Children can easily access to the upper walkway garden with iron stairs. The connection between the ground floor level with the walkway garden created a continuous cycle of circulation with the stairs. This has formed an interesting discovery space for the children where they can freely move from ground to the top and back down.

Fig. 12. Outdoor Access in My Montessori Garden Preschool

Source: Archdaily (2024)

The preschool building, designed in typical housing style with brick walls and locked doors, lacks proper design consideration for outdoor learning spaces. Most of the time, the children's play and learning activities are confined to the indoor spaces, severely limiting their access to the outdoor area.

Fig. 13. Outdoor Access in Tabika KEMAS Keramat Nur Parlimen Titiwangsa

Source: Xiang et al. (2024)

Source: Authors (2024)

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Discussions

In the light of the findings above, first, Montessori preschools typically select muted, earthy colour palette and simple natural materials to create a calm, uncluttered space that supports focused learning (American Montessori Society, 2024). In contrast, Malaysian public preschools often choose white walls as the main neutral backdrop and one (1) accent wall with cartoon wallpaper pattern in warm colours (Shaari et al., 2020) and complemented by colourful plastic furniture which may lead to an overuse of colour that can overstimulate children (Thung & Ahmad, 2022). Therefore, the strategic selection of a captivating colour palette and the use of material is paramount for crafting an enthralling learning play space at a preschool to engage children's senses and ignite their imagination, fostering a wide array of enriching play experiences (PPG Paints, 2014). As the Montessori prepared environment is meticulously designed to cultivate children's sensory awareness through LTP (Xiang et al., 2024; Kiran et al., 2021; Mavrič, 2020). Therefore, the Montessori colour palette template and materials can serve as a valuable reference for creating a visually stimulating and developmentally appropriate learning play space at preschool.

Second, the findings indicate that both preschools have intentionally incorporated child-scaled furniture and equipment to create optimal learning environments that support children's growth and development (Gumulya & Adiputra, 2020). Montessori preschools emphasised the concept ‘prepared environment’, along with the principle of ‘everything child-sized’, allowing children to engage with their surrounding independently and meaningfully through active exploration, independent learning, and meaningful engagement without constant adult assistance (Xiang et al., 2024). However, in the Malaysian KEMAS preschool, despite the presence of child-sized furniture and facilities, children are unable to use the tools and materials independently without constant teacher guidance. This indicates a disconnect between the prepared environment and the level of freedom and independence afforded to the children in Malaysian public preschools (Xiang et al., 2024). As such, it is a critical need to create a truly prepared environment in Malaysia public preschools that aligns with the Montessori approach that empowers children's independence, freedom, and engagement in learning, ultimately fostering a culture of LTP.

Third, the findings indicate Montessori preschool embracing an open-plan layout as part of the ‘prepared environment’, featuring minimal and flexible physical barriers to create a degree of seclusion within the seamless, interconnected spaces, catering to the children's diverse needs and activities (Xiang et al, 2024). This open design allows children to freely navigate the space, empowering them to select their preferred mode of learning and exploration that best suits their individual needs, either independently or collaboratively in groups. In contrast, the learning spaces in Malaysian KEMAS preschool is compartmentalised through the use of fixed furniture and partitions. Each area has designated functions, where the children are expected to sit or stand around tables, and engage in specific activities, such as playing with small toys and materials, reading or drawing. This rigid structure limits the flexibility and freedom of movement for the children, as they are confined to their assigned spaces and activities. Indeed, Montessori prepared environment with an open-plan concept can serve as a reference to provide a learning environment with varied spaces that encourage exploration, independence, and a more holistic LTP approach.

Furthermore, the open-plan layout of Montessori preschool creates an uncluttered, accessible and flexible environment that allows children to freely explore and learn at their own pace without restriction. The clear, defined pathways and circulation patterns in the environment enable children to move freely between indoor and outdoor spaces, fostering a strong sense of movement and exploration throughout the school. Inversely, children in Malaysian KEMAS preschool often face reduced accessibility due to the cluttered layout of the fixed furniture. The significant amount of floor space occupied by the permanent fixtures leaves little room for flexible circulation within the environment, resulting in cramped conditions for the children. The lack of open space and freedom of movement can hinder the children’s ability to freely

https://doi.org/10.24191/bej.v22i2.1359

explore, play, and learn, negatively impacting their overall development and learning experience. To create optimal LTP environments, it is crucial to prioritise flexible, accessible spaces that incorporate clear pathways and ample opportunities for free movement throughout the environment. This concept will cultivate children's exploration, discovery, and autonomy for enhancing children's holistic development and learning experience.

Finally, Montessori classrooms are designed to seamless integrate indoor and outdoor learning environments, encouraging children to freely access the outdoor spaces from indoor areas. The continuity of the prepared environment, where the indoor classroom is expanded or integrated with dynamic external learning areas that incorporate natural elements, will significantly enhance children's cohesive and harmonious learning experience, thereby supporting their holistic development (Smith et al., 2019). Unfortunately, the current education system in Malaysia seems to prioritise indoor learning over outdoor exploration and play for the children (Nazri & Shaari, 2023; Saleh et al., 2018). Most of the time, the children's play and learning activities are confined to locked indoor spaces, with virtually no access to the outdoor environment, compounded by the lack of proper design considerations for outdoor learning spaces that effectively restricts children's ability to freely transition between indoor and outdoor environments, depriving them of the valuable benefits that dynamic outdoor exploration and play can offer for their holistic development (Nazri & Shaari, 2023; Santoso, 2022). Urgent action is needed to address this critical issue by prioritising the inclusion of accessible, well-designed outdoor learning environments, similar to the Montessori facilities.

To fully implement LTP as the main pedagogy in ECE and develop better children's play behaviour patterns in Malaysian preschools for the future, several improvements are needed. However, as mentioned earlier, there is a critical gap in the design guidance that governs the planning framework for the spatial design of ECE in Malaysia, hindering this transformation. To address this challenge, this paper proposes a set of spatial design recommendations for preschools in the Malaysian Context (Table 4) which is aligned with the design principles of Montessori education environments, to effectively support the implementation of LTP pedagogy.

Table 4. Propose Spatial Design Recommendation for Preschool in Malaysia Context

Spatial Design Features	Spatial Design Recommendation
Aesthetic of Space	Selection of nature colour palette template with natural materials to provide a visually stimulating environment to cultivate children's learning and foster engaging learning experience for them.
Anthropometric design	The furniture and facilities are designed to be 'everything child-sized' principle, promoting children's independence and self-confidence. Moreover, the space shall be designed to allow children easy access and independent operation of all elements, without requiring adult assistance.
Variety of spaces	The learning environments are designed with an open-plan design with flexible separators, creating a variety of spaces that provide freedom to the children to access all the areas, personalise and reinvention the spaces, and engage in their desire activities.
Layout and circulation	The learning environment are designed to be uncluttered, accessible and flexible environment without rigid and fixed furniture arrangement, allowing children navigate easily throughout all spaces.
Outdoor access	Seamless integration of indoor and outdoor learning environments with flexible separators, such as sliding doors or retractable walls, allows children to easily move between indoor and outdoor areas. Designing the outdoor spaces as an extension of the indoor learning environment offers dynamic and unique learning exploration for children.

Source: Authors (2024)

https://doi.org/10.24191/bej.v22i2.1359

CONCLUSION

The quality of the built environment in preschools, which is thoughtfully planned, is essential to the successful delivery of the LTP approach in ECE. When children are able to engage in play-based learning within a well-designed environment, they experience deeper engagement, joy, and a sense of agency in their own learning, which ultimately enhances their overall development and wellbeing. As discussed, the present design guidance that governs the planning framework is sparsely documented, and it shows the minimum requirement and is limited to general aspects of the spatial design for ECE in Malaysia. Hence, the quality of learning space design in Malaysian preschools must be urgently addressed and improved to effectively support LTP curricula and promote positive learning and development in children. This study found that the quality of the spatial design in Montessori preschools effectively supports the LTP approach. By adopting these Montessori-inspired design principles, Malaysian public preschools can create a vibrant and nurturing learning environments that foster children's holistic growth and development that align with the LTP.

In conclusion, it is crucial to carefully select a nature-inspired colour palette in the learning spaces in preschools. The preschool shall be incorporated an open-plan layout design with a flexible and accessible environment to curate a variety of distinct learning spaces for the children. However, it is crucial to seamlessly integrate the indoor and outdoor environments. These dynamic, child-scaled spaces should allow children to freely explore and easily access all elements tailored to their needs. This approach further supports their independence and self-directed discovery, fostering a stimulating and engaging learning environment. This paper offers comprehensive and valuable insights for educators, designers, policymakers, and scholars in the field. Future studies on the quality of the physical learning environment in preschools should focus on spatial design and consider relevant policies and guidelines to bridge the gap between aspiration and implementation.

ACKNOWLEDGEMENTS/FUNDING

The authors would like to acknowledge the support of Jabatan Kemajuan Masyarakat Kementerian Kemajuan Desa dan Wilayah (KEMAS) for providing the facilities and documentation on this research.

CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

AUTHORS' CONTRIBUTIONS

Pang Ling Xiang developed and conceptualised the core research idea while establishing the theoretical framework. She conducted the research, authored, and revised the article. Alice Sabrina Ismail supervised the research progress, guided the review and revisions, and approved the article for submission. Siti Sara Binti Mohd Ariff contributed to the research efforts to shape the direction of the research.

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