Space planning of classroom kindergarten: A case study of KEMAS kindergartens in Batu Pahat, Johor, Malaysia

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Abstract. The numbers of kindergarten in Malaysia boost every year as a learning environment for children as preparation for them to face the next level of education in primary school. Thus, comfortable learning environments are essential to enhance not only well-being but also increase the productivity and learning of the children. Therefore, the importance of organization and utilization of spaces can influence children’s activities and learn. This paper aims to identify the criteria of space planning and the issues of space comfort of the public kindergarten in Batu Pahat, Johor, Malaysia. By using a case study as a method, the observation of the classrooms and interviews with the teachers of the kindergarten emphasized the specific space planning applied in public kindergarten. However, some issues are highlighted regarding interior decoration and space arrangement by the occupant. Data obtained hopefully will give some ideas and benefit for the future direction of kindergarten’s teacher, authority, architect, and designer to improve the quality of the physical environment, especially in creating space for children.

1. Introduction
In recent years, early childhood educations become the forefront of education in Malaysia despite the quality of early education that needs to strengthen as part of the program of the government [1-2]. However, to date, as the increasing number of children enrollment in kindergarten in Malaysia. The quality of the physical environment of kindergarten also needs to address consistent with the quality of education and curriculum [3]. Previous studies have emphasized the importance of space planning and aesthetic elements stimulate children’s imagination and strengthen their feeling toward school [4-5]. Children prone to have difficulties in differentiating spatial places unless geometric thing surrounding learning space stimulate their imagination [6]. Since the nature of children is to explore and seeking new things. Well-defined spatial planning is vital for them to exhibit their emotion, communication, and movement with surrounding [7-8]. Reflecting on the current scenario of public kindergarten in Malaysia, most public kindergarten buildings were built not originally for kindergarten purposes and require some renovation to fit the requirement of authority in developing kindergarten [9]. It might influence the space planning and congested space of the kindergarten [10]. Thus, this paper tends to identify the criteria of space planning and issues regarding space comfort of classroom kindergarten. It is significant to recognize the space planning criteria and problems as the subject matter in designing the physical learning environment of public kindergarten in Malaysia.

2. Space planning for kindergarten
Studies indicate that children’s social, emotional, physical attributes and growth are profoundly affected by the environment quality [11-12]. In supporting the idea of creating a quality environment,
the quality design and suitable space organisation in kindergarten can become a priority since children spend much time within spaces in the classroom rather than other places in kindergarten building. Hence, preparing spaces for children needs new considerations and looks because children are more affected than adults from their surrounding environments [4]. Several aspects identified need to be considered in planning spaces for children in kindergarten, including size and area; layout; equipment, furniture and facilities; colour and visual appearance of the space [5].

2.1. Size and space layout

The first important aspect that needs to consider in planning spaces for a classroom is size and area. The size of the kindergarten building might differ based on the design guideline of each country. In a general guidelines, the floor area or space of the preschool facility depending on the capacity of the building (number of children) [13]. The measurement of the required space children needs to include the furniture and also their relationship with other children’s dimensions. As for the context of Malaysia, the overall space provided for kindergarten is divided based on the guideline from Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia (table 1).

### Table 1. Spaces and areas for kindergarten in Malaysia [14].

| Spaces               | Components and area (ft/m) |
|----------------------|----------------------------|
| Floor space          | i. Area per children: 15 ft (4m) × 25 children: 375 ft (35 m) |
|                      | ii. Kitchen: 48 ft (4.5 m)  |
|                      | iii. Toilet: 65 ft (6 m)    |
|                      | iv. Staff room: 218 ft (20 m)|
|                      | v. Store: 70 ft (6.5 m)     |
|                      | vi. Route space: 210 ft (20 m) |
|                      | Total: 986 ft (92 m)        |

Planning classroom space is a crucial decision for the teacher in arranging the tables, chairs, and other materials to encourage active involvement in the lessons and stimulate teacher and student interaction also social development [15]. Children need enough space to cater to their nature of being active, especially for high mobility activities, such as tumble around, running and jumping [16]. In clearly defined the space layout of kindergarten, [6] suggested at least five key spaces is needed, i.e., entrance, learning area, playing area, kitchen and toilet in creating space for children based on their activities and learning practice.

The method of subdividing zone of the space practical implements for more organises space layout and arrangement [17]. Each space that organised for children needs to be well designed and featured with the elements of welcoming, comfortable, safety and security to foster engagement of children with the learning environment [6,18]. For example, the entrance can become a zone for welcoming and reserved for children’s arrival; thus, the aspect of safety and security is important in this space.

2.2. Equipment, furniture and facilities

The second consideration that important is equipment, furniture and the facilities that support the optimisation of the space. Research on ergonomically designed proved that furniture makes the classroom and learning experience more comfortable and pleasurable [19]. Children are less disposed to back pain and increase their productivity and concentration of learning. Rather than that, ensure the comfortable environment, space, equipment and facility are proportion and with scale and height of children for them in easy accessing all the facilities provided [13]. Durable and safety always become a priority concern in choosing material for children.

Besides that, the arrangement of the chair and table is essential in influencing children’s attention in classes. There are four types of layout usually identify in the classroom, i.e., a) Traditional layout: Teacher has eye contact with all the students for “teacher-centred” learning, b) U-shape layout: Students can have eye contact with their classmates, c) Fish-bowl layout for bigger group discussion:
Circle shape layout and effectively without the tables d) Grouping layout: Smaller groups can work together but also have eye contact with the other groups [15,20].

2.3. Colour and visual appearance
The application of colour and graphics also has a significant impact on children’s spaces in kindergarten. Research believed that children between ages three to six years show a strong interest in colour rather than forms [4]. The choices of colour have a relation with the age and the emotion of the children. Previous research indicated that kindergarten that uses bright and warm colours tend to reduce the tension, nervous and anxiety [21]. Warm colours such as orange, pink and red are suitable for children with ages 3 to 6 because of the ability of the colour to reduce the tendency of children’s tension, nervous and anxiety [21]. Thus, children that are surrounded by the space that has warm colours feeling excited and energetic in exploring things in their surroundings.

3. Methodology
This study employed a case study method consists of observation on the indoor classrooms of four kindergartens under the Community Development Department (KEMAS) in Batu Pahat, Johor as representative of public kindergarten. The characteristic of four kindergartens (K1, K2, K3 and K4) have similarities in terms of the type of building (single complex type) and natural in ventilated. However, the locations and structure of each building are different to compare the issues that occur in each type of kindergarten building. Besides that interview with four KEMAS kindergarten teachers also done to identify occupants’ evaluation on space utilization in the kindergarten. The interview session was conducted in the form of a semi-structured interview where the predetermined question was prepared. This type of interview is more relaxed and flexible where the list of questions is used as reminders for the interviewee to cover the key topics. Analyses identified based on criteria of space planning; size, space layout, furniture and equipment arrangement, colour and visual appearance of the spaces. All analyses were tabulated and illustrated as findings of this paper.

4. Data analysis
4.1. Observation
4.1.1. Size and space layout. The size of most kindergarten classrooms is within the size that allocates in a guideline from the Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia which is 92m² of total floor space. Only K1 indicates less size of floor area (78m²) which does not comply with the specification of the guideline (table 2). In terms of space layout, the appropriate method in subdividing the space into particular zones; entry, active, quiet and messy zone [17,22]. Observation indicates that most of the kindergarten divided the space according to the specific zone such as entry zone (entrance, teacher area and storage), active zone (learning, playing and exhibition area), a quite zone (resting and reading area) and messy zone (kitchen, dining area and toilet). Arrangement of bookshelves and furniture indicates the subdividing zone allocate. The sub-divided zones of space usually arrange based on the schedule of activities and programs of teachers and children. As for K4, the partition used in creating a sense of privacy and indication of a resting area for children and a prayer section for the teacher. In some cases, such as K2 and K4, the dining spaces are placed in the kitchen area to segregate the eating area from the classroom area. Figure 1 shows the example space layout and circulation of K1.
Table 2. Summary of size and space layout for all kindergartens

| Criteria of space planning | K1: The building built for the purpose of kindergarten | K2: Community hall as kindergarten | K3: Special Site Building | K4: Modified of a public building as kindergarten |
|----------------------------|-----------------------------------------------------|----------------------------------|--------------------------|-----------------------------------------------|
| Size floor area            | 78m²                                                | 93m²                             | 134.33m²                 | 99.19m²                                      |
| Space layout               |                                                     |                                  |                          |                                              |
| Entry zone                 |                                                     |                                  |                          |                                              |
| Teacher area               |                                                     |                                  |                          |                                              |
| Storage                    |                                                     |                                  |                          |                                              |
| Active zone                |                                                     |                                  |                          |                                              |
| Learning area              |                                                     |                                  |                          |                                              |
| Playing area               |                                                     |                                  |                          |                                              |
| Exhibition area            |                                                     |                                  |                          |                                              |
| Quiet zone                 |                                                     |                                  |                          |                                              |
| Resting area               |                                                     |                                  |                          |                                              |
| Reading area               |                                                     |                                  |                          |                                              |
| Messy zone                 |                                                     |                                  |                          |                                              |
| Kitchen / dining area      |                                                     |                                  |                          |                                              |
| Toilet                     |                                                     |                                  |                          |                                              |

4.1.2. Furniture arrangement and play equipment. Observation on furniture and play equipment identified that most of the furniture is proportion with the height and scale of the children such as table, chairs and bookshelves. All the play equipment such as object play, wooden and interlocking blocks, learning aids can be reached by children independently. In most kindergarten classroom the colourful plastic chair and table used to give a sense of attraction to the children. In terms of furniture layout, most of the kindergarten classroom arrange with group type of furniture layout. The reason is to segregate the children’s activities and program according to the age of group 4 to 6 years old. Besides that, the availability of open areas prepared for active mobility activities such as jumping,
dancing or running. In some cases, such as K4, the safety values added by using a play mat from rubber and non-slippery material to prevent children from slippery and injury during playing activities.

4.1.3. Colour and visual appearance of the classroom. In terms of colour and wall decoration, most of the classrooms used cool colour such as pink, purple, blue as wall painting. Cool colours are associated with a more tranquil environment. Since children are still in their developing’s learning and knowledge and exploring new things, so they tend to be attracted to bright and warm colours [21]. Therefore, by introducing warm colours is more preferred to enhance children’s critical thinking, memory, and performance in learning [23]. Variety types of bright colours mural of alphabet, animal figure and numbers also painted in some classroom as an element of learning for children.

4.2. Interview with teachers

4.2.1. Teachers perspective on space planning. The response to the interview identified most the teacher are satisfied with the arrangement of the spaces within the classroom. However, some issues were identified regarding the need for partition as a separated area in the classroom and differentiate children’s activities areas. The inappropriate structure design and material of the kindergarten that influence children’s movement also highlighted. In terms of how regularly they have organised the arrangement of space in the classroom, most of them only planning the spatial arrangement of the kindergarten ones a year or less according to children’s activities and curriculum. Some the teacher suggested that have specific planning or guideline is important to improve the creativity and knowledge in planning the space according to the need of the children.

4.2.2. Equipment and facilities. The teachers were asked about type of equipments, the majority commented that the arrangement of the chair and table were organized every year based on the quantity of the children registered. The issues regarding the condition of the furniture that out-date in design and not enough also commented. In terms of facilities provided, most of the teachers reported that the utilisation of toilet and sink are important elements introduced to children for self-hygiene learning in kindergarten. Thus the condition of the facilities needs to be friendly for them.

4.2.3. Colour preferences. When asked about colour preferences, most of the teachers rarely change the colour and visual appearance of the classroom. The minority of them preferred to decorate their classroom wall with wallpaper for easy maintenance. The majority used mural painting paints on the specific wall as a visual attraction for the children. The Alphabet display, numbering display and animation figure with various colour are among the example of a graphic mural that is frequently painted on the wall. Some teachers explained that decoration on the wall could attract children’s attention and become an aid for a teacher in learning activities in the classroom. In response to the selection of paint, the majority of the teachers not aware of the suitable paint material that safe for children. The unawareness might because of a lack of knowledge regarding suitable paint material that safe for children and a limited budget.

5. Discussion and conclusion

The finding highlighted that issues such as the organisation of space, choice of colour schemes, condition of furniture and facilities among frequent issues observed and discussed during the interview with occupants. This supported that teachers are lack motivation in organising the classroom and children not attached to the space that provides for them. It is strengthening that space planning and condition of a classroom of public kindergarten in Malaysia need to improve toward more children friendly learning space in the future. The implications of appropriate size, space layout, circulation, furniture proportion, arrangement, colour and visual appearance of the classroom among the criteria need to consider in planning the space for children. Spaces planning of kindergarten is associated with functionality, attractiveness, creativity, imagination and diversity of the area that express through colour, texture, shape and volume as comfort and pleasant environment for children [22]. In most
developed countries, the responsiveness regarding creating space that friendly for children are well recognise and aware. The projection of modern kindergarten classroom design implements with the implementation of technology, flexible multiple learning tools and creative modern furniture to evolve the conventional type of classroom [19]. In other ways, the sustainable method of redesigning the interior of the classroom with the application of environmentally friendly material, i.e., wood and safety colour paint for the facade of the building in upgrading value and quality of classroom design [22]. However, limited financial and cost for maintenance become one of the constraints improving space planning of public kindergarten. The exposure of teachers on knowledge space planning and material might develop the creativity of them as well as enhance their awareness regarding provided children with a comfort and friendly learning environment.

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**Acknowledgements**  
This study is supported by Geran Pencarian Pascasiswa (GPPS) UTHM (Vote H015).