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SPATIAL FUNCTION ANALYSIS OF STUDENTS' LEARNING PATTERN, LEARNING POSTURE AND LEARNING ACTIVITIES IN SCHOOL RESOURCE CENTERS

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Abstract

Aesthetic factors often become a consideration when associated with designing School Resource Center (SRC). This can be seen everywhere in SRCs around Malaysia. In fact, SRC is supposed to have a proper spatial planning that aligns with students' learning behavior, pattern and activities in order to sustain the utilization of the space, practical and functional to the user. Many assumed that activities occurred should adapt with the space provided, but in the case of SRC, it should be the other way round. Therefore, this paper intends to investigate the types of learning pattern, learning posture and activities in current situations in SRCs in Malaysia in order to create a proper space planning that could aid learning behavior. This paper provides an insight for future researchers interested in the area of sustainable space planning.

Keywords: school resource center; space planning; sustainable

1.0 INTRODUCTION

The Ministry of Education Malaysia embodied "21st Century Learning" or "Pembelajaran Abad ke 21" (PAK21) to meet with the current educational needs and brought new changes to the world of education based on student-centred learning for a better education system. The paradigm shifts in PAK21 gave favourable impacts towards creativity and flexibility of "21st Century's School Resource Center" (BTP, 2017).

21st Century School Resource Centre (SRĆ) is an informal learning space where it should be created in keeping with various students' learning patterns', posture and activities. Many researchers have characterized the optimal needs when designing SRC. Among them are, the space in SRC should be characterized by sufficient space, plentiful collection, and effective management in order to ensure optimum utilization by the occupants (Atmodiwirjo et al., 2012). Others mentioned that a student's learning posture which is related to learning activities. such as. discussion, doing homework, reading and playing, could affect the use of space; thus, affecting the student's performance (Jato et al., 2013). According to Zaharudin (BTPN Interview: April 1, 2019), SRC should meet one of the assessment requirements to be an excellent SRC which is the optimization and effective use of the space; but sadly, most SRCs in Perak still do not meet the notion of 21st Century SRC.,

From aforementioned statements, it is clearly stated that space planning is one of the main considerations in designing SRC. In addition, enhancing the quality of life is the main intention of sustainability concept (Schlebusch et al., 2013), which is, lying out the solution of the spatial design that could last for a long time and at the same time also facilitate the user's needs. Ragheb et al. (2016) stated that the effective use of the space by occupants is one of the pivotal examples in sustainability concept. Spatial design in this study context refers to the distinguishing feature and peculiar quality of space that is sustainable to its users as aptly mentioned in any space syntax literature.

Professor Bill Hillier first initiated the space syntax which is a technique for analyzing and reporting the relationships between the buildings and spaces of urban areas, as well as the

relationship between spatial layouts within the buildings (Jacoby, 2006). When measuring spatial planning, Spatial Function Analysis has been introduced to measure how space is being used. The function of the space and the activities occurred can be determined through observations, static snapshots, user traces, interviews, facility surveys and many others.

In measuring the students' learning patterns, postures and activities, this paper demonstrates several methods of observing and measuring the ways buildings are used, as shown in Figure 1 below:

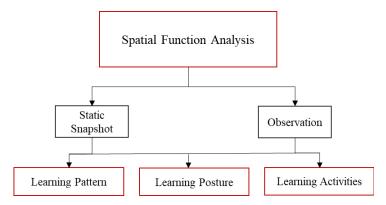


Figure 1: Framework of spatial function analysis

2.0 METHOD AND APPLICATION

2.1 Cases

This qualitative method of the study has adopted the case study approach by focusing on the three spatial layout plans of SRC 1) SC1, 2) SC2 and 3) SC3. The selected cases were chosen partly due to their winning of "Anugerah Pusat Sumber Cemerlang Negeri Perak" from 2015-2019 (BTPNP, 2017). However, only three SRCs have been chosen based on the types of school.

rable 1. Case study profile									
Table 1: School Profile									
Code	SC1	SC2	SC3						
Location	Ipoh, Perak (Suburbs Area)	Kuala Kurau Perak (Rural Area)	Taiping, Perak (Urban Area)						
SRC Size	4316 sqft	1872 sqft	4488 sqft						
Total Occupancy 154		64	183						

Table 1: Case study profile

Each SRC took up five days to be investigated as Malaysia's school operation days are from Monday to Friday. The duration of the investigation was different for each SRC due to its operation hours. The duration of observation was thirty minutes for every SRC.

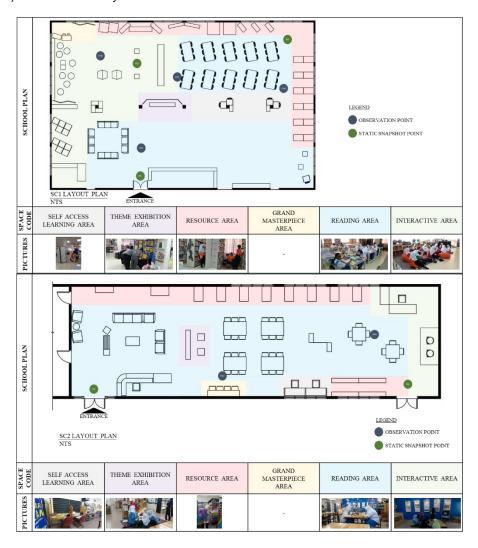
2.2 Spatial Function Analysis

Spatial function analysis in this study was developed from spatial form analysis where at this stage, covering isovist area, perimeter measures were used to investigate each layout plan. Therefore, in the guideline provided, SRC space such as open reading area, discussion area, edutainment area, learning area for groups, leisure reading area, research collection

area and computer area have been added to the SRC design requirement in order to enhance the learning environment (BTP, 2017). This is in line with achieving 21st century SRC, where it should have a self-learning area, grand masterpiece area, resource area, theme exhibition area, reading area and interactive area (KPM, 2017).

Space syntax aims to provide an objective method for representing the continuous spatial layout of a building, in relation to the way it will be used. In this stage, specific spatial function analysis within each plan is used to examine the SRC space of user experience.

Two types of measurement were conducted to determine the Spatial Function Analysis, which are, Static Snapshot and Observation. These methods were conducted based on three (3) criteria; which are: 1) Learning Pattern – observing the individual or group learning; 2) Learning Posture – observing the posture of learning e.g. sitting, standing, etc; and 3) Learning Activities – observing activities e.g. reading, discussing, etc. These three criteria determined how much the space had been occupied, types of physical setting suitable for such activities, types of space frequently used, the way the space functioned according to the activities, and ineffective use of space (rarely used). There were six (6) observed spaces for these three schools as required by BTP and KPM, which included: 1) Self Access Learning Area; 2) Grand Masterpiece Area; 3) Resource Area; 4) Theme Exhibition Area; 5) Reading Area; and 6) Interactive Area. Figure 2 shows the location of snapshot (SS1, SS2) and observation (OB1, OB2) at each case study.



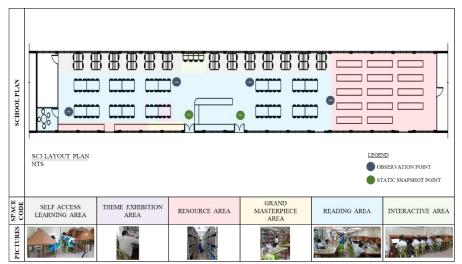


Figure 2: Static snapshot and observation point at each SRC

3.0 RESULT AND DISCUSSION

This paper describes the methods for measuring and extrapolating the spatial and the learning process of SRC users. The methods, which are, captured static snapshots and observations of layout plans, were examined qualitatively. The methods are signified by analysing three different SRCs which acknowledged the sample size of SRC. The data derived from the demonstration provide an insight into the spatial and learning patterns, postures and activities, with each case having some similarities and disparities. The layout plan in Figure 2 shows the snapshots and observation points conducted to determine students' learning behaviour, while Table 2 shows the result of the static snapshots and observations:

Table 2: Shows the data from static snapshot and observation of each SRC.

						servation of ea	
Spaces	Indication	School .	Day 1	Day 2	Day 3	Day 4	Day 5
; Aroa	l L	Scl	•	1 Individual Learning		2 Individual Learning	•
	Learning Pattern	Sc2	•	1 Group Learning	1 Individual Learning	1 Group Learning	•
		Sc3	40 Individual Learning	27 Individual Learning	40 Individual Learning	33 Individual Learning	26 Individual Learning
min	l	Scl	•	1 Sitting on The Chair		2 Sitting on The Chair	•
Solf Access Learning Area	Learning Posture	Sc2	-	2 Sitting on The Chair	1 Sitting on The Chair	2 Sitting on The Chair	-
		Se3	85 Sitting on The Chair	83 Sitting on The Chair	97 Sitting on The Chair	99 Sitting on The Chair	78 Sitting on The Chair
	Learning Activities	Sel	-	1 Reading		2 Reading	-
		Se2	-	2 Doing Homework	1 Reading	2 Reading	-
		Se3	40 Reading	61 Doing Homework	52 Doing Homework	51 Doing Homework	36 Doing Homework
	Learning Pattern	Scl	•	•	•	•	•
		Sc2	•			•	•
Αma		Sc3	•	1 Group Learning	·	•	•
Grand Masterpiece Area	Learning Posture	Scl	-	-	-	-	-
Master		Sc2	-	-	-	•	-
T T		Se3	=	3 Standing	-	-	-
0	Learning	Sel	=	-	-	-	-
	Learning Activities	Se2	-	-	-	-	-
		Sc3	•	3 Do Others Works		•	-
	Learning Pattern	Scl	16 Individual Learning	4 Individual & Group Learning	8 Individual Learning	9 Individual Learning	9 Individual Learning
		Se2	3 Individual Learning	8 Individual Learning		2 Individual Learning	-
		Sc3	2 Individual Learning	2 Individual Learning	1 Group Learning	16 Individual Learning	20 Individual Learning
_		Scl	41 Standing	14 Sitting on Stool	20 Standing	15 Standing	10 Sitting on Stool
Resource Area	Learning Posture	Sc2	4 Sitting on The Floor	8 Standing		5 Standing	
amoun		Se3	2 Standing	4 Standing	2 Standing	42 Standing	23 Standing
2				16 Relax/Sleep/Chitchat/Do			
	Learning Activities	Scl	38 Choosing Books	Nothing	18 Choosing Books	12 Reading & Choosing Books	8 Choosing Books
		Sc2	5 Choosing Books	8 Choosing Books		4 Choosing Books	•
		Se3	1 Doing Homework & Reading	3 Reading	2 Reading	39 Choosing Books	21 Choosing Books
Твени Ехьійніоп Атеа	Learning Pattern	Scl	1 Individual Learning		1 Group Learning		1 Group Learning
		Sc2	1 Individual & Group	10 Group Learning	1 Individual & Group	4 Group Learning	
			Learning		Learning		<u> </u>
		Sc3	•	•	1 Individual Learning	l Individual Learning	1 Group Learning
	Learning Posture	Scl	4 Standing	•	4 Standing	•	2 Standing
		Sc2	3 Sitting on The Floor	45 Sitting on The Floor	10 Sitting on The Floor	13 Sitting on The Floor	•
Тюп		Se3	-	-	1 Standing	1 Standing	2 Standing
	Learning Activities	Scl	4 Do Others Work	-	4 Do Others Work		2 Do Others Work
		Se2	3 Doing Homework	25 Doing Homework	5 Doing Homework	8 Playing/Surfing	-
		Se3	•	-	1 Reading	1 Reading	2 Discussion
Scading Area	Learning Pattern	Sel	46 Group Learning	56 Group Learning	51 Group Learning	77 Group Learning	23 Group Learning
		Se2	17 Group Learning	23 Group Learning	6 Group Learning	17 Group Learning	1 Group Learning
		Sc3	38 Group Leaning	39 Group Leaning	50 Group Leaning	31 Group Leaning	21 Group Leaning
	Learning Posture	Sel	196 Sitting on The Chair	295 Sitting on The Chair	240 Sitting on The Chair	381 Sitting on The Chair	106 Sitting on The Chair
		Se2	66 Sitting on The Chair	110 Sitting on The Chair	29 Sitting on The Chair	70 Sitting on The Chair	2 Standing
2		Se3	155 Sitting on The Chair	138 Sitting on The Chair	186 Sitting on The Chair	157 Sitting on The Chair	106 Sitting on The Chair
	Learning Activities	Scl	144 Reading	148 Reading	96 Reading	276 Reading	100 Reading
		Se2	21 Discussion	78 Doing Homework	15 Doing Homework	21 Reading	2 Choosing Books
		Se3	57 Doing Homework	68 Doing Homework	67 Doing Homework	68 Doing Homework	59 Doing Homework
	Learning Pattern	Sel	11 Group Learning	6 Group Learning		11 Group Learning	-
Ілтепетіче Атва		Se2	l Group Learning	1 Group Learning	1 Group Learning	•	<u> </u>
		Sc3	-	1 Group Learning	2 Group Learning		1 Group Learning
	Learning Posture	Scl	32 Sitting on The Floor	6 Sitting on The Stool		28 Sitting on The Chair	-
		Sc2	2 Standing	4 Standing	3 Standing	-	-
		Se3	-	2 Standing	4 Sitting on The Chair	-	6 Sitting on The Chair
	Learning Activities	Scl	21 Playing/Surfing	15 Playing/Surfing	-	43 Playing/Surfing	-
		Se2	2 Relax/Sleep/Chitchat/Do Nothing	6 Discussion	3 Relax/Sleep/Chitchat/Do Nothing	-	-
		Se3	-	2 Relax/Sleep/Chitchat/Do Nothing	4 Reading	-	6 Playing/Surfing
				ivoining			

From Table 2, the most visited area by students in groups was the Reading Area. Most likely, they were using chairs while doing their homework. This is followed by activities of reading, discussion and choosing books. The Resource Area was the second most utilised. Students are more likely to stand while choosing the books and some of them will be sitting on the stool and floor to read the books individually. For Interactive Area, SC1 is more likely used by the students because the position of this space is segregated from the other area where

they are likely to sit on the floor to play board games or surf the internet by using a laptop or computer. Most SRCs did not provide a seating area in their Theme Exhibition Area. However, for the Theme Exhibition Area in SC2 and SC3, there is space for students to use. Thus, if there is no exhibition event, students can still use the area to do other work like doing homework, discussion, reading and others. The area that had been least visited by students in most SRCs was the Self-Access Learning Area; but not for SC3 as this area is a favourite spot for students to do their homework and reading as the space is enclosed and a bit private from other areas. And lastly, the Grand Masterpiece Area was rarely used by students of SC3, whilst was never used by students in SC1 and SC2.

From the analysis, it can be concluded that:

- 1) Learning Behaviour analysis
 - i. The most popular learning pattern is group learning (highlighted in green color) students are more likely to study in groups especially when they are using an interactive area and open space to do activities such as reading. The most commonly used learning posture is sitting on the chair (highlighted in blue color) they are more likely to use the chair as it makes them comfortable to sit for more than 1 hour.
 - ii. The most utilised learning activity is doing homework (highlighted in orange color) most of the students would do their homework in SRC before they go back home especially when it comes to having a group discussion.

2) Space Efficiency analysis

- i. The most occupied spaces at all-time are reading and resource areas a reading area can cater for students' activities, such as doing homework, discussion, reading and sometimes playing board games. Resource area is a must to have in SRC as it is the only area that can keep all the resources for students' references
- ii. Averagely occupied spaces but are essential for SRC are interactive, self-access learning and theme exhibition areas in the interactive area, students are inclined to have the space more cozy where they can do anything with their friends. The location of the self-access learning area should be at an isolated area where most SC3 students often use this area even if they are in a group because the location of this area provides privacy. This space should be provided with tables and chairs as the students still can use the space for other activities when there is no exhibition event.
- iii. The only unoccupied space is the grand masterpiece area for this area, every school only displays their masterpieces. Students mostly did not use this space because it is too isolated from other areas and the chairs provided are unsuitable for their activities.

4.0 CONCLUSION

Although SRC was previously said to be of an aesthetic value, which plays the most important role in designing SRC, the spatial function analysis of this study has verified the fact that spatial planning indeed is significant in the design of SRC to suit students' learning environment.

The results presented in this paper have shown that students are more inclined to use the space that can accommodate their needs and their learning activities instead of just having aesthetic factors in SRC. This paper also shows that most students often use the Reading Area followed by the Resource Area, Interactive Area, Theme Exhibition Area and Self Access Learning Area. Changes should be made to the Grand Masterpiece Area as it is just a wasted area where students do not fully utilize the space. To create student-centered learning space, the space provided in SRC might need to be reconsidered as some of the spaces were inefficient towards learning activities.

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