THE RELATIONSHIP BETWEEN LEARNING SPACE ATTRIBUTES WITH STUDENTS' SATISFACTION AND PERCEIVED PERFORMANCE

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Abstract

The shift in the learning patterns of the current generation motivates the changes in the setting of learning spaces. This research objective is to examine the association between Learning Space attributes with student satisfaction and perceived performance. A survey was conducted in Universiti Teknologi MARA (UiTM), Perak Branch, Seri Iskandar Campus, Malaysia. A questionnaire was administered and collected from 410 students, where respondents were asked to select their preferences based on a five-point Likert scale of agreement and satisfaction. The analysis was conducted using PLS-SEM: Smart-PLS Version 3.2 to examine the measurement and structural model of the research. Results indicated that there is a significant relationship between Learning Space attributes with student satisfaction and perceived performance. The overall findings of this research show that the research variables successfully predicted the model.

Keyword: learning space, environment, design, facilities, satisfaction, performance

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INTRODUCTION

Educators and students have gained the benefits of learning spaces. It discusses on more accurate dimensioning of spaces using the correct tools and equipment (Lomas & Oblinger, 2006; Montgomery, 2008; Oblinger, 2006). In the University, learning space is divided into two different types of environment that are traditional (formal) and non-traditional (informal) (Whiteside, Brooks, Walker, 2010). Many researchers define formal learning as a well-organised environment while informal learning as an environment that is not structured (Andreatos, 2007; Hall, 2009; Malcolm, Hodkinson, & Colley, 2003; Marsick, & Watkins, 2001; Schugurensky, 2000).

Learning Space: Environment, Design and Facilities

According to Cambridge dictionary, the environment can be defined as the conditions that you live or work in and the way that they influence how you feel or how efficiently you can work. Temple (2007), and Higgins, Hall, Wall, Woolner and McCaughey (2005) describe the specifics of environmental conditions impact on student learning. The environmental conditions discussed are factors such as temperature, noise, lighting, and ventilation (Higgins et al., 2005; Keep, 2002; Lackney & Jacobs, 2002). Physical environment such as lighting, temperature, air quality, noise, and space organization influence students' satisfaction which relate to students' performance.

As stated in Oxford dictionary, design is defined as a plan or drawing produced to show the look and function or working of a building, garment, or other object before it is made. Researchers highlighted that occupant satisfaction is affected not only by indoor environmental parameters but also by workspace and building features, such as the view, control over the indoor environment, amount of privacy as well as layout, size, cleanliness, aesthetics and office furniture (Bluyssen, Aries, & van Dommelen, 2011; Choi, Aziz, & Loftness, 2009; Marans & Yan, 1989; Schakib-Ekbatan, Wagner, & Lussac, 2010; Veitch, Charles, Farley, & Newsham, 2007). The design factors of a building and its uses consist of several modules. The modules are building features, background of the occupants, location and description of workspaces, availability of space, office layout, visual privacy, ease of interaction, furnishings, colours and textures, and visual privacy (Zagreus, Huizenga, Arens, & Lehrer, 2004). Fister (2009) claimed that comfortable furniture and warm colours are the most important features of learning space. Thus, it can be concluded that the characteristic of space design comprises of layout, furniture, colours and textures

As specified in Oxford dictionary, the facility is defined as a place, amenity, or a piece of equipment provided for a particular purpose. The concept of the physical learning environment concerning physical structures relates to spaces, equipment and tools within the learning space (Lehtinen, 1997). Cleanliness and maintenance are also one of the facility characteristics.

Additionally, access to food is one of the most important features of learning space for students (Fister, 2009). Therefore, it is concluded that facilities consist of tools, equipment, cleanliness, access to food and beverage.

Learning Space: Satisfaction and Perceived Performance
Researchers found that increased satisfaction lead to improved performance (Lehtinen, 1997; Organ, 1977; Schwab & Cummings, 1970). Oblinger (2006) highlighted that the brilliant outcome produced by the students partly depends on the better spaces and tools provided to them. Therefore, it is vital to know what they need beforehand in completing a task. Students' satisfaction influences their learning performance.

HYPOTHESIS AND RESEARCH MODEL
Figure 1 portrays the conceptual research model for this research. It is theorized that there are factors of three learning space influencing students' satisfaction that relate to students' performance in an academic building. These factors include; (i) Environmental Factor, (ii) Design Factor and (iii) Facilities Provided.
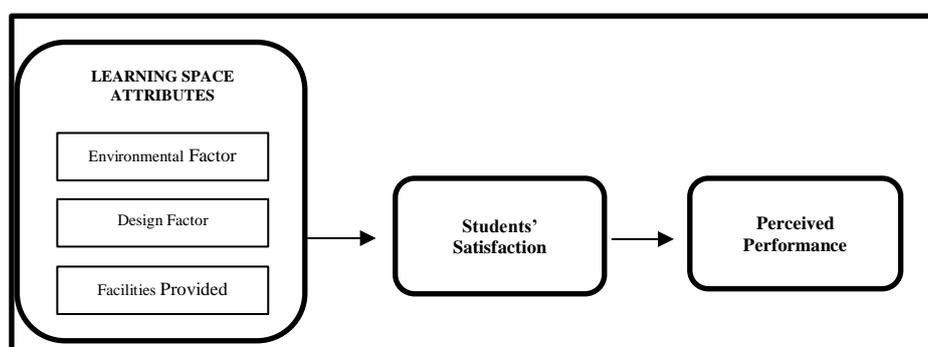

Figure 1: Conceptual research model

This researh proposes four hypotheses which are as follows:
H1. Environmental Factor in a learning space has a positive relationship with Students' Satisfaction
H2. Design Factor in a learning space has a positive relationship with Students' Satisfaction
H3. Facilities provided in a learning space has a positive relationship with Students' Satisfaction
H4. Students' Satisfaction has a significant positive influence on Perceived Performance.

RESEARCH METHODOLOGY
This research applies analytic survey using cross-sectional research design. The survey was conducted to determine the relationship between learning space attributed to students' satisfaction and perceived performance in UiTM Perak Branch, Seri Iskandar Campus. Data was gathered through a set of structured questionnaires distributed to the students. The sample was selected from the students of Faculty of Architecture, Planning and Surveying (FSPU), and Faculty of Art and Design (FSSR) (Semester: September 2017 – Jan 2018) with the total population (N) 8,039 students. This research utilised random sampling technique where a group of respondents is randomly selected from a studied population. The number of sample required was calculated using Slovin's formula. The methods are as follows:

Total population FSPU (N) = 6,574 students
Total population FSSR (N) = 1,465 students
Formula = $n = N / (1 + N e^2)$
Confidence level 95% (a margin of error of 0.05) or confidence level 97% (a margin of error of 0.03)
Plug the data into the formula: $n = N / (1 + N e^2)$
N = Total population; e = margin of error

Calculation 1	Calculation 2
$\dfrac{8039}{1 + 8039 (0.0009)} = 1100$	$\dfrac{8039}{1 + 8039 (0.0025)} = 399$

The total sample size in this research range from 399 to 1100. For this research, a total sample size of N=400 was sufficient with confidence level 97% and margin of error of 0.03.

The survey questionnaires used in this research consists of two main sections: Respondent Profile (Section 1) and Students' Perception on Learning Space (Section 2). The second section of the questionnaire is divided into five parts where Part A, B and C emphasis on the independent variable (IV) of this research, which are Environmental Factor (Part A), Design Factor (Part B) and Facilities Provided (Part C). While Part D focuses on the aspect of students' satisfaction as the indirect variable between the independent variable and the dependent variable of the research. Finally, Part E inquires on the students' perceptions towards their performance in relation to their satisfaction level towards the learning space. All items in Section 2 of the questionnaire survey were adapted and modified from previous research on indoor environmental quality (IEQ) (Abdul Tharim, Abdul Samad, & Ismail, 2017) and also taken from different literature on satisfaction research.

RESULTS

The items in the second section of the questionnaire were measured using a 5-item scale and were analysed using SPSS 22 and Smart-PLS 3.2. Table 1 portrays that most of the respondents prefer hostel (65.5%) as their favourite informal learning space and studio (35.6%) as the most favourite formal learning space. Hence, the results show that respondents preferred informal learning space compared to formal. The majority of the respondents (96%) agreed on the importance of learning space in an institution.

Table 1: Demographic profile of the respondent

Description	Percentage (%)	Description	Percentage (%)
Age		**Informal Learning Space**	
>18-21	74.3	-Campus Cafeteria	14.8
>21-23	24.4	-Fast Food Restaurant	15.3
>23	1.3	-Musolla/ Mosque	4.4
Gender		-Hostel/ Home	65.5
-Female	63.4	**Formal Learning Space**	
-Male	36.6	-Library	29.4
Research Mode		-Classroom	30.4
-Diploma	75.8	-Studio	35.6
-Bachelor Degree	24.2	-Lab	4.7
Research Year		**Favourite Learning Space**	
-Year 1	15.1	-Informal	56.1
-Year 2	40.3	-Formal	43.9
-Year 3	38.4	**The Importance of Learning Space**	
-Year 4	6.2	-Yes	96.9
Faculty		-No	3.1
-FSPU	80		
-FSSR	20		

Measurement Model Analysis

Table 2 summarizes the results of the measurement model of the research after a few adjustments were made. The overall model consists of 27 items: seven items for Environmental Factor, six items of the Design Factor, and nine items for Facilities Provided. A total of six items were deleted from environmental factor section, and one item from facilities provided to increase the composite reliability

of the independent variable. As for the Students' Satisfaction, which is an indirect variable of the model; all four items measuring the variable were maintained. Perceived Performance is the last dependent variable of the model. The original three items were reduced to a single item measurement to increase the reliability of the dependent variable. Results of the model are illustrated in Figure 2.

Table 2: Measurement model analysis results

Construct	Item	Convergent Validity		Internal Consistency Reliability		Discriminant Validity	
		Cross Loading	**AVE**	**Cronbach Alpha**	**Composite Reliability**	**HTMT**	**VIF**
		>0.50	*>0.50*	*0.60-0.90*	*0.60-0.90*	*Confidence Interval Does Not Include 1*	*<5.00*
Environmental Factor (EF)	7	0.664-0.780	0.526	0.849	0.886	Yes	1.279
Design Factor (DF)	6	0.772-0.832	0.623	0.878	0.908	Yes	1.740
Facilities Provided (FP)	9	0.541-0.804	0.508	0.877	0.902	Yes	1.588
Satisfaction (SAT)	4	0.823-0.859	0.716	0.868	0.910	Yes	1.000
Performance (PER)	1	1.000	1.000	1.000	1.000	Yes	

Table adapted from Hair, Hult, Ringle, & Sarstedt (2014)
*AVE: Average Variance Extracted; HTMT: Heterotrait-Monotrait Ratio; VIF: Collinearity Statistics

Reliability of the measurement model was measured using Cronbach's Alpha coefficient (> 0.6) to assess the inter-item consistency and Composite Reliability (> 0.7) (Fornell & Larcker, 1981). Table 2 shows that the Cronbach Alpha ranged from 0.849 to 1.000 and the Composite Reliability ranged from 0.886 to 1.000. The values proved that the items were consistent.
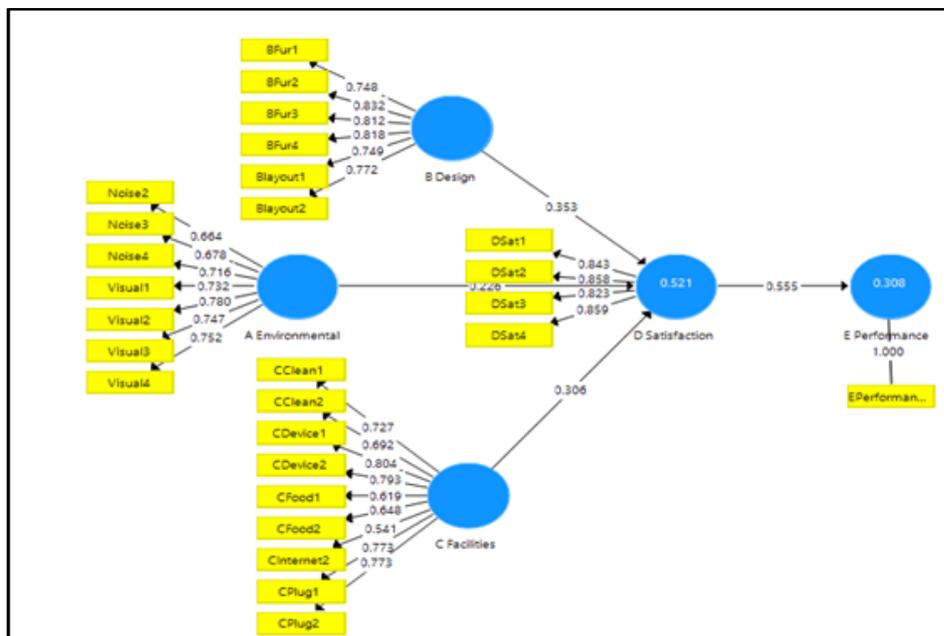
Figure 2: Structural model

The primary purpose of validity test is to measure the fitness of the designed test (Sekaran & Bougie, 2013). The validity of the measurement model is tested using convergent validity and discriminant validity. Convergent validity can be assessed through the factor loadings, composite reliability and average variance extracted (AVE) (Hair et al., 2014). Table 2 shows that the factor loading of each item in the construct exceeded the endorsed value of 0.5 (Hair et al., 2014). Additionally, the value of composite reliability of the model ranged from 0.886 to 1.000. Hence surpassed the recommended value of 0.7 (Hair, Black, Barin, & Anderson, 2010). The AVE values which ranged from 0.508 to 1.000 also exceeded the endorsed value of 0.5 (Fornell & Larcker, 1981; Hair et al., 2014; Barclay, Higgins, & Thompson, 1995). The values indicate the overall amount of variance in the items for the latent construct. Therefore, the result for convergent validity is acceptable for the measurement model.

The discriminant validity of the measurement model is indicated by the weak correlation between items between different constructs (Cheung & Lee, 2010). Discriminant validity is identified by looking at the collinearity statistic of the Variance Inflation Factor (VIF) of the constructs. Table 2 shows that all constructs in the model obtain VIF values of less than 5. Therefore, there are no collinearity issues between the constructs. To further examine the status of discriminant validity, it is best to assess the measurement model in PLS-SEM (Henseler, Ringle, & Sarstedt, 2014). The HTMT criterion value is used to

confirm that the items across the constructs measure different constructs in the model. The confidence interval value of HTMT statistic must not comprise the value of 1 for an entire combination of the construct (Hair et al., 2014). Table 3 shows that HTMT values of the entire construct is less than 0.90 which indicates minimal discriminant validity for the model.

Table 3: Heterotrait-Monotrait Ratio (HTMT)

Variables	EF	DF	FP	SAT	PER
Environmental Factor (EF)					
Design Factor (DF)	**0.519**				
Facilities Provided (FP)	0.402	**0.684**			
Satisfaction (SAT)	0.574	0.729	**0.674**		
Performance (PER)	0.389	0.495	0.514	**0.595**	

Structural Model Analysis

To test the hypotheses of the research, a structural model was tested and analyzed where all variables hypothesized to influence Student's Satisfaction with Learning Space were significant where the p-value is less than 0.05:

- **Hypothesis 1,2 & 3** – Students' Satisfaction on Learning Space provided at UiTM Perak is influenced directly by Environmental Factor (t = 5.609; *p 0.000*), Design Factor (t = 6.621; *p 0.000*), and Facilities Provided (t = 6.839; *p 0.000*). Therefore, only hypothesis H_1, H_2 and H_3 are supported.
- **Hypothesis 4** – There is a positive significant relationship between Students' Satisfaction and Perceived Performance. In other words, Students' Satisfaction has a strong direct influence on Perceived Performance. Results from the path analysis indicates significance level at (t = 13.408; *p 0.000*).

A Q^2 value larger than zero in the cross-validated redundancy measures indicate that the exogenous constructs have predictive relevance for the endogenous constructs under consideration. In this study, the value of the Q^2 for Students' Satisfaction (0.342) and for Perceived Performance (0.299), which is well above zero, indicating the predictive relevance of the PLS path model.

CONCLUSION

This research tested a conceptual framework model based on the learning space satisfaction literature. The instrument used in this study fulfiled the acceptable requirements of the reliability and validity analyses. The outcome of the path model analysis has confirmed that Learning Space attributes of Environmental Factor, Design Factor and Facilities Provided are significantly correlated with Students' Satisfaction and Perceived Performance in Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus.

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