

# Frequency Index for Learning Space in Higher Education Institutions

A.I. Che-Ani<sup>a, b \*</sup>, N.M. Tawil<sup>a, b</sup>, A.R. Musa<sup>a</sup>, M.M. Tahir<sup>a</sup>, N.A.G Abdullah<sup>a</sup>

<sup>a</sup>*Department of Architecture*

<sup>b</sup>*Centre for Engineering Education Research*

*Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia*

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## Abstract

Learning space is a major asset to higher education institutions in Malaysia. The availability of appropriate space, the provision of the right space, and the management of space is an essential part of an asset management strategy for any institution. Learning space should be effectively and efficiently used so as not to become a burden and waste of space to the higher education institutions. Thus, this study of the Frequency Index of the learning space is important to measure the learning space usage based on the teaching and learning schedule (timetable) provided by the institutions. The methodology in developing the Frequency Index of learning space is by analyzing the timetable data provided by the institutions and the list of learning spaces available at the institutions. The timetables gave an actual usage indication of the learning space. The calculation of the usage frequency are divided into 3 measures, first is by the calculation of usage frequency during office hours (8 am to 5 pm), second, the calculation of usage frequency after 5 pm (5 pm to 10 pm), and third, the overall time usage. The Frequency Index is classified according to the level of usage while the interval percentage of the learning space usage frequency is classified based on the following scale: minimal usage at 0%-50% usage frequency, optimal usage at 50%-75% usage frequency, maximal usage at 76%-100% usage frequency and critical usage at more than 100% usage frequency. This classification of Frequency Index is expressed in terms of linguistic values and the color-coded keys. From this index, the institution can have a clear idea whether their existing learning space is best used or vice versa, which in turn can be a reasonable basis whether the respective institution is in need of new learning space or not.

*Keywords:* Frequency index, learning space, space management, building survey;

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\* Adi Irfan Che-Ani. Tel.: +6-019-203-3551  
*E-mail address:* adirfan@gmail.com

## **1. Introduction**

The government has given serious emphasis on asset management in the Government Asset Management Policy (DPAK) in 2009 because of huge investments have been made to the development and provision of assets (Government of Malaysia, 2009). Learning space management is one of the most important in the management of physical resources management in Higher Education's Institutions (HEI). Space management is considered important not only in terms of optimization of the usage but also related to the cost of maintenance operations. Learning space should be managed effectively and efficiently so as not to be burden and there are no wasted spaces in HEI. If this is happened it will create uncomfortable learning environment, therefore will interfere with the student's focus that ultimately affect the quality of their learning. Environmental influences also a contributing factor to the failure or excellence of a student (Muhd. Nazmi Ismail, 2002).

However, many institutions claim to have a lack of learning space (Ahmad. Fauzi A. Wahab, 2005). In relation to this, Wamer and Leonard (1992) explained that most institutions of higher education is not optimizing the use of physical resources at particular times, such as lower consumption during the learning session, was not used in the evenings, nights, holidays and semester breaks. The management of space is therefore an essential part of an asset management strategy for any institution (TEFMA, 2009). Learning space should be effectively and efficiently managed as to optimize the building usage and at the same time can provide cost saving to the building operational cost. This study is important in identifying the usage pattern of physical resources capacity in HEI.

## **2. Research Objectives**

When discuss about space audit there are three terminologies, i.e. first is space utilization, which provides an overall guide to how well the space is being used during teaching hours, secondly is the frequency, how often a room is used and lastly the occupancy where the number of people in the room in relation to its capacity (University Rooms Audit, 2011). This paper only focuses on the frequency usage for the learning space in order to determine the frequency rate. Due to the lack of the research in this area in Malaysia and most of the reference are come from the technical reports and internal or national guidelines in other countries such as United State of America (USA), United Kingdom (UK) and Australia (Mohd Shahrul Abdul Rahman et al., 2009). The purpose of this study is to introduce the appropriate formulation for frequency rate in the space audit evaluation that can be used to develop the frequency index through the analysis of the learning timetable data.

## **3. Formulation of Frequency Rate Based on Timetable**

Learning space usage data through the timetables give an indication the actual usage of the facility in an institution. Space Frequency pertains to the space being physically in use, not the theoretical use as recorded as bookings on a room booking or scheduling system (TEFMA, 2009). This data is useful to understand the use of institutional facilities. Frequency rate is determined by analyzing the learning space timetable data usage. The calculation of the frequency rate is divided into three steps namely:

- i. Typical daytime lecture session (8am-5pm)
- ii. After 5 pm lecture session (5pm-10pm)
- iii. The overall time lecture session (8am-10pm)

As known typical learning time at HEI in Malaysia are from 8am until 5 pm, 5 days in a week. So the total lecture time in a week are 38 hours, this not included 1 hours time break and 3 hours time breaks on Friday. Hence the others lecture time recommended shown in the Table 1.

Table 1. Recommended typical lectures time

	Time	Hours per day	Hours per week
Typical Daytime Lecture Session	8 am – 5 pm	8 hours (6 hours At Friday)	38 hours
After 5 pm Lecture Session	5 pm – 10 pm	5 hours	25 hours
Overall time lecture session	8 am – 10 pm		38 hours

Frequency rate is the number of hours the learning space is in use, during the lecture session divided by the number of hours that the learning space is available for use, according to the recommended typical lectures time. A clear understanding can be gained through the Figure 1.

Frequency of Typical Daytime [%]	$F_N = \frac{\text{Total usage hours} [\%]}{38 \text{ hours}}$
Frequency of after 5 pm lecture session [%]	$F_S = \frac{\text{Total Usage Hour} [\%]}{25 \text{ Hours}}$
Frequency of Overall Time [%], Lecture Session	$= \frac{F_N + F_S [\%]}{N}$ $= \frac{F_N + F_S [\%]}{38 \text{ Hours}}$

Figure 1. Space frequency rate formula

#### 4. Learning Space Frequency Index

Frequency index is to determine the frequency of use of learning spaces that are classified according to the levels of use as the use of minimal, optimal, and maximal use of critical applications as shown in table 2. Referring to TEFMA (2009), the use of optimal learning space is 75% usage frequency. Therefore the classification of the learning space usage is classified by the percentage of learning space usage. Based on the interval percentage of learning space usage frequency will results the Frequency Index of learning space utilization. The Frequency Index specified in term of value score and colour key as shown in the Table 2.

Table 2 The determinants of Learning space Frequency Index

Index	Range	Indicator	Usage intervals percentage	Description
1	0-1	Minimal Usage	0-50%	The usage frequency at the low level
2	1-2	Optimal Usage	51-75%	The usage frequency at the best level
3	2-3	Maximal Usage	76- 100%	The usage frequency at the high level
4	3-4	Critical Usage	>101%	The usage frequency at the crucial stage because has exceeded the typical time

### 5. Case Study

The case study involved 62 tutorial room's timetable data in semester 1 2011/2012 session at university 1. To determine the Frequency Index of tutorial room at University 1, the frequency rates should be obtained first, as shown in Appendix 1.

Figure 2 and Table 3 shows the Overall Frequency Index of tutorial room usage at University 1 in semester 1 2011/2012 session is at the level 3. This indicates that the tutorial room frequency are in the maximal usage with an average percentage are 93%.

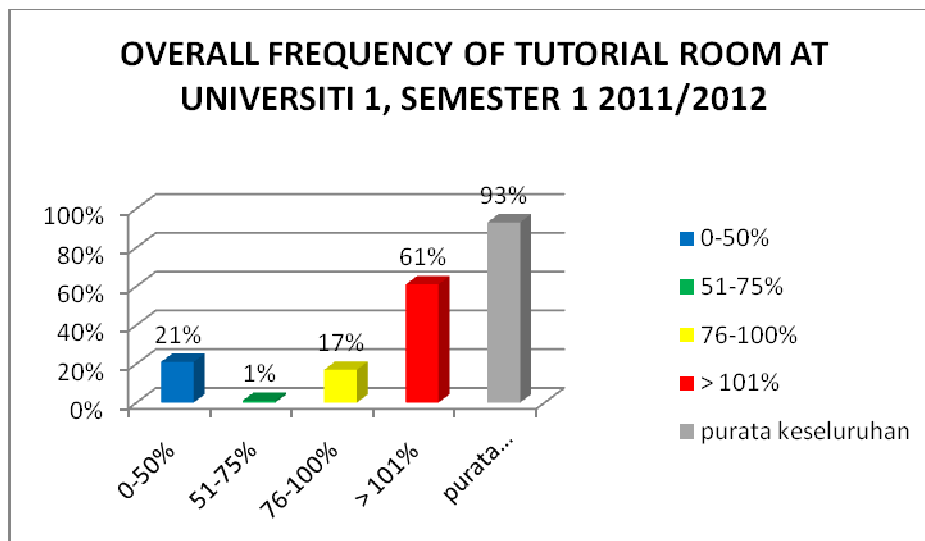


Figure 2 Overall frequency Index of tutorial room at universiti 1, semester 1 2011/2012 session

Table 3 Overall frequency Index of tutorial room at universiti 1, semester 1 2011/2012 session

Index	Indicator	Range	Usage intervals percentage
1	Minimal Usage	0-50%	21%
2	Optimal Usage	51-75%	1%
3	Maximal Usage	76- 100%	17%
4	Critical Usage	>101%	61%
Average			93%

Index	1	2	3	4
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Figure 3. Overall frequency Index of tutorial room at universiti 1, semester 1 2011/2012 session

## 6. Research Finding and Discussion

Table 4. University Index the Usage of Tutorial Room

University Index	Index	Range	Indicator	Usage intervals percentage
	1	0-1	Minimal Usage	0-50%
	2	1-2	Optimal Usage	51-75%
University 1	3	2-3	Maximal Usage	76-100%
	4	3-4	Critical Usage	>101%

Table 4 shown the result of the frequency index analysis found that the frequency index for tutorial room at Universiti 1 was at the level 3, this shows that the usage of tutorial room at university 1 was in maximal usage. This indicates that the use of tutorial room after 5 p.m was relevant due to the lack of space. This situation must be monitor and take a immediate step to ensure the fluency of the learning space usage for students and lecturers. Due to this situation the university learning space can be used with multi-functions.

If the use of learning space can be used optimally as possible, then the lecture sessions can be conducted consistently from 8 a.m until 5 p.m only. Apart from that the university may rent it to external organization. Space management is considered important not only in terms of optimization but also related to the cost of maintenance operations.

## 7. Conclusion

Space must be managed efficiently by HEI. Its usage must be measured so that we can identify the need of an extra learning space (if any). The Frequency Index is proposed as one method in measuring the space usage. This index

also indicates whether there is a need to conduct the lecture after 5pm. The availability of space and the lecturer time itself have to be match in generating the reliable academic time table, so that the space can be used wisely. This is always a debate, but we have to fine tune with it in providing optimal usage of learning spaces.

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### Appendix 1

