APPENDIX A

Survey Version 4.0
By: Raja Nur Syaheeza Raja Mohd Yazit

Code:
Kod:

UNIVERSITI SAINS ISLAM MALAYSIA
جَامِعَة العُلوم الإسْلامِيَة المَالِيزِيَة
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

Survey: The Effects of Daylighting on Students' Hafazan Learning Task Performance

Kaji Selidik: Kesan Pencahayaan pada Prestasi Tugasan Pembelajaran Hafazan Pelajar

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Researchers:
Penyelidik:

Ar. Dr. Elina Mohd Husini	-	Supervisor
	-	*Penyelia*
Raja Nur Syaheeza Raja Mohd Yazit	-	Postgraduate Student
	-	*Pelajar Pasca-Siswazah*

Part 1	:	Questionnaire
Bahagian 1	:	*Soal Selidik*
Part 2	:	Visual Test
Bahagian 2	:	*Ujian Visual*

Information Sheet

You are given five (5) minutes to read through the information sheet.

You are asked to participate in a research study regarding relationship between natural daylighting in learning space and the student's performance in reading and writing task. You were selected to be a possible participant because of your age and your enrollment in the Ulul Albab/Islamic Religious education.

Total of students are depending on the classroom sizes, where 2.5m^2 per each student. The primary purpose of this study is to identify the relationship between acceptable illuminance level in learning space with the student's performance. You will be asked to complete the survey and the visual test accordingly. There are no risks associated with this study. There is no compensation for the participants.

All information will be treated confidentially. All information will be coded. The collected data will be used for a further study in future. Research records will be stored securely and only accessible by the researchers. Your decision to involved in this study will not affect your current or future relations with Universiti Sains Islam Malaysia.

Helaian Maklumat

Anda diberi lima (5) minit untuk membaca helaian maklumat ini.

Anda diminta untuk mengambil bahagian dalam kajian penyelidikan mengenai hubungan antara pencahayaan semula jadi dalam ruang pembelajaran dan prestasi pelajar dalam tugasan membaca dan menulis. Anda dipilih untuk menjadi peserta kerana umur anda dan penglibatan anda dalam pendidikan Ulul Albab/Agama Islam.

Jumlah pelajar bergantung kepada saiz bilik darjah, iaitu 2.5m^2 per pelajar. Tujuan utama kajian ini adalah untuk mengenal pasti hubungan antara tahap pencahayaan yang boleh diterima dalam ruang pembelajaran dengan prestasi pelajar. Anda akan diminta untuk melengkapkan kaji selidik dan ujian visual dengan sewajarnya. Tiada risiko yang berkaitan dengan kajian ini. Tiada pampasan bagi para peserta.

Semua maklumat akan disimpan secara rahsia. Semua maklumat akan dikodkan. Data yang dikumpul akan digunakan untuk kajian selanjutnya pada masa akan datang. Rekod penyelidikan akan disimpan dengan selamat dan hanya boleh diakses oleh penyelidik. Keputusan anda untuk terlibat dalam kajian ini tidak akan menjejaskan hubungan semasa atau masa depan anda dengan Universiti Sains Islam Malaysia.

Objectives:
Objektif:

i. To identify the range of acceptable illuminance level for students' optimum hafazan learning task performance at working plane of 900 mm and 300 mm height from floor level.

Untuk mengenal pasti pelbagai tahap pencahayaan yang boleh diterima untuk prestasi optimum tugasan pembelajaran hafazan pelajar pada ketinggian paras kerja 900 mm dan 300 mm dari paras lantai.

ii. To evaluate the horizontal illumination of ranges of WFR at 300 mm height from floor level.

Untuk menilai pencahayaan mendatar julat WFR berlainan pada ketinggian 300 mm dari paras lantai.

iii. To recommend the optimum WFR at 300 mm height from floor level that achieve acceptable illuminance level for students' optimum learning performance in classrooms.

Untuk mengesyorkan julat optimum WFR pada ketinggian 300mm dari paras lantai yang mencapai tahap pencahayaan yang boleh diterima untuk prestasi pembelajaran pelajar yang optimum di bilik darjah.

Supervisor
Penyelia

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PART 1: **Questionnaire**
BAHAGIAN 1: ***Soal Selidik***

Procedure
Prosedur

1. Identify the condition of selected areas/spaces.
   Mengenalpasti keadaan kawasan / ruang yang dipilih.

2. Questionnaires are given out to students.
   Soal selidik diberikan kepada pelajar.

3. Questionnaire content briefing.
   Taklimat kandungan soal selidik.

4. Briefing by researchers on scientific terms.
   Taklimat oleh penyelidik mengenai istilah-istilah saintifik

5. Students to answer in 20 min.
   Pelajar untuk menjawab dalam 20 minit.

Instruction
Arahan

Fill in the blank and tick [/] to the appropriate answer.
Isikan tempat kosong dan tandakan [/] pada jawapan yang sesuai.

Section 1: **Demographic**
Seksyen 1: ***Demografi***

Name
Nama _____

Age
Umur _____

1. Gender
   Jantina

   ☐ Male
   Lelaki
   ☐ Female

Section 2: Daylight Condition
Seksyen 2: Keadaan Pencahayaan

No	Question	1	2	3	4	5
		Too dim *Terlalu gelap*	Dim *Gelap*	Neutral	Bright *Terang*	Too bright Terlalu terang
1	The brightness of the room *Keterangan cahaya bilik darjah*					
2	The size of the classroom window *Saiz tingkap bilik darjah*	Too small *Terlalu kecil*	Small *Kecil*	Normal *Biasa*	Big *Besar*	Too big Terlalu besar
3	Amount of daylight in classroom *Tahap cahaya di dalam bilik darjah*	Too low *Terlalu rendah*	Low *Rendah*	Normal *Biasa*	High *Tinggi*	Too high Terlalu tinggi

PART 2: **Visual Test**
BAHAGIAN 2: ***Ujian Visual***

Instruction
Arahan

Fill in the blank and tick [/] to the appropriate answer. Please refer to the Arabic Reading Acuity Chart: Modified *Balsam Alabdulkader-Leat (BAL) Chart* provided with the survey. Please record the time taken for you to rewrite the Reading Acuity Chart in the box provided, referring to the stop watch provided in front of the classroom.

Isikan tempat kosong dan tandakan [/] pada jawapan yang sesuai. Sila rujuk Carta Ketajaman Bahasa Arab: Carta Balsam Alabdulkader-Leat yang disediakan. Sila catatkan masa yang diambil untuk anda menulis semula Carta Ketajaman Bacaan dalam kotak yang disediakan, merujuk kepada jam yang disediakan di hadapan kelas.

Section 1: **Reading and Writing**
Seksyen 1: ***Membaca dan Menulis***

Refer the Arabic Reading Acuity Chart given with the questionnaire.
Rujuk Carta Ketajaman Bahasa Arab yang disertakan dengan soal selidik.

Rewrite the Arabic Reading Acuity Chart (rewrite the words, not the size of font).
Tulis semula Carta Ketajaman Bahasa Arab (menulis semula ayat, bukan saiz font).

Line (*Baris*) 1:_____

_____

Line (*Baris*) 2:_____

_____

Line (*Baris*) 3:_____

_____

Line (*Baris*) 4:_____

_____

Line (*Baris*) 5:_____

_____

Line (*Baris*) 6:_____

_____

Line (*Baris*) 7:_____

_____

Time taken to rewrite:	minute	second

Section 2: Questionnaire – Learning Task Performance

Seksyen 2: Soal Selidik – Prestasi Tugasan Pembelajaran

Answer this section based on your task in the previous section.
Jawab bahagian ini berdasarkan tugasan anda di bahagian sebelumnya.

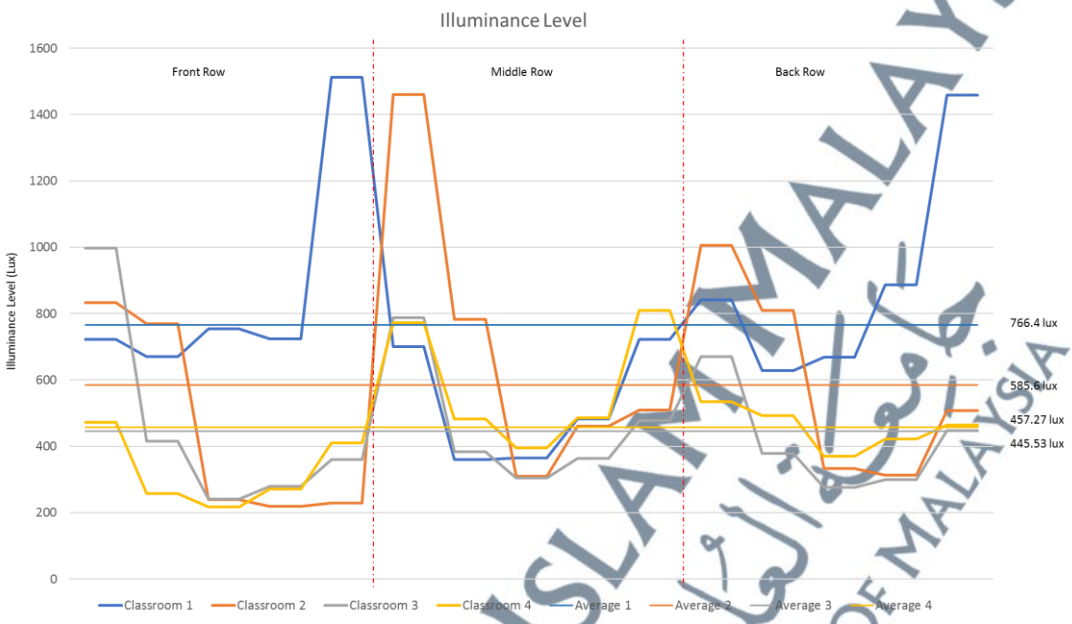
No	Question	1	2	3	4	5
		Very Disagree *Sangat Tidak Setuju*	Disagree *Tidak Setuju*	Neutral	Agree *Setuju*	Very Agree Sangat Setuju
1.	You can read the Eye Chart clearly. *Anda boleh membaca Carta Mata dengan jelas.*					
2.	You can rewrite the Eye Chart clearly. *Anda boleh menulis semula Carta Mata dengan jelas.*					

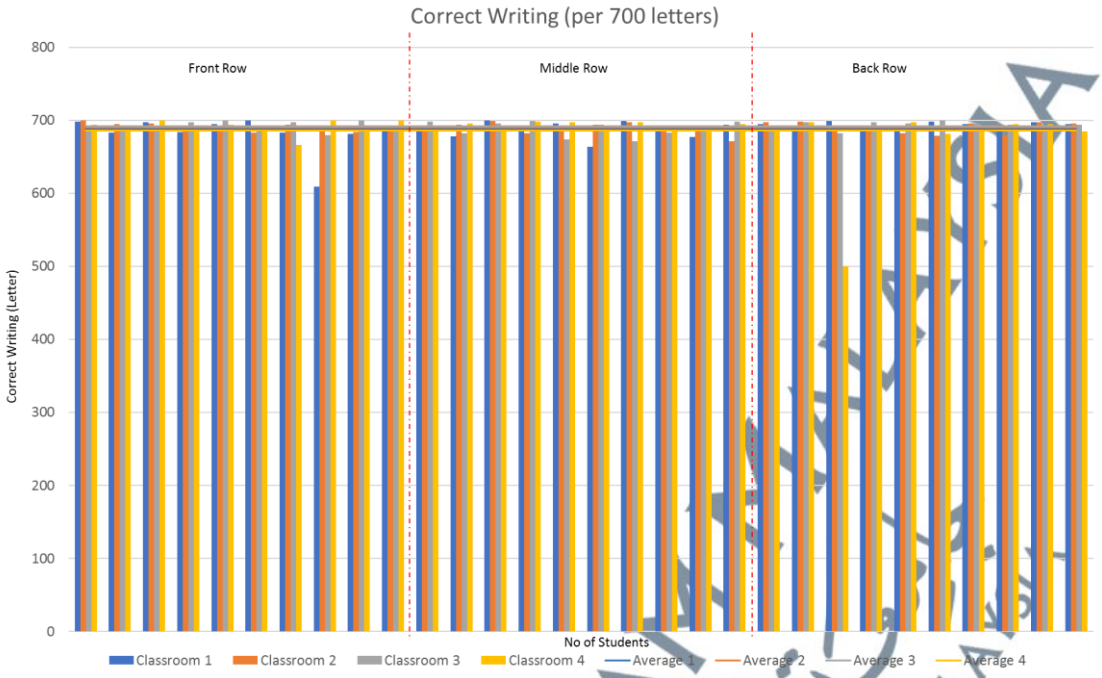
----- END OF SURVEY -----

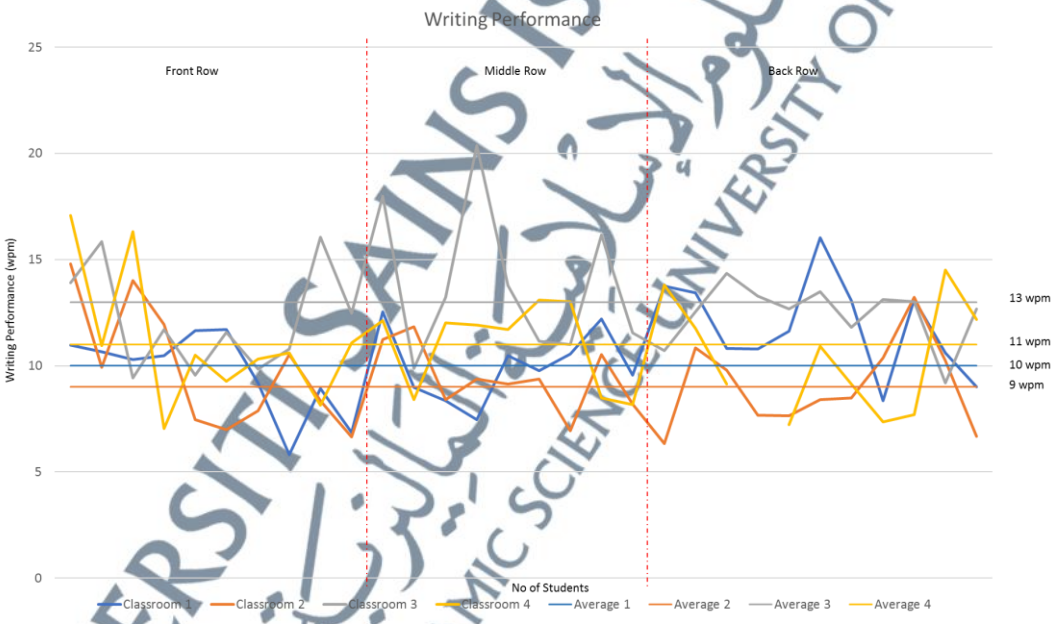
----- SOAL SELIDIK TAMAT -----

APPENDIX B

Experiments Raw Data Collection Results

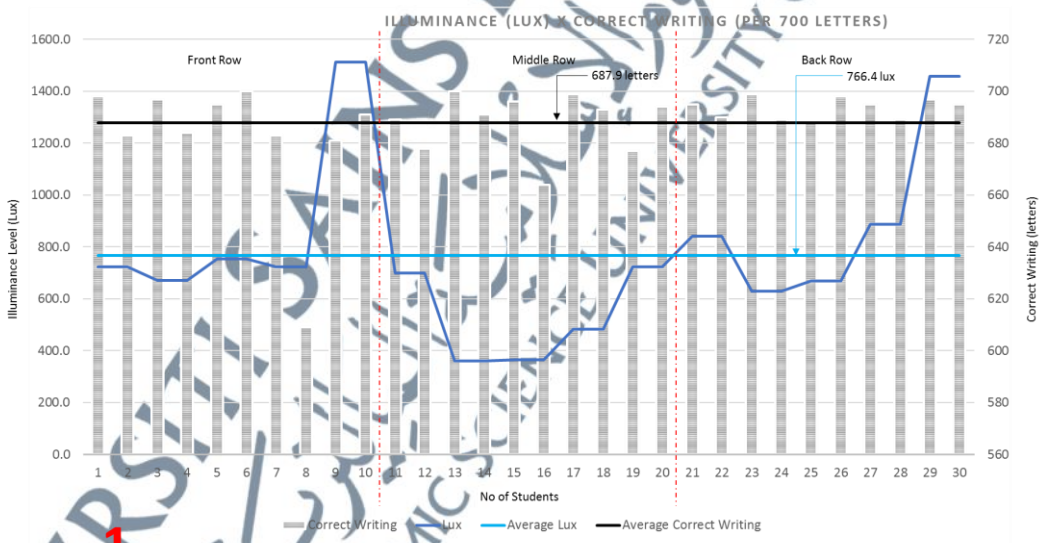






Date : 15 Sept 2018
Classroom 1 - (3 Umar)

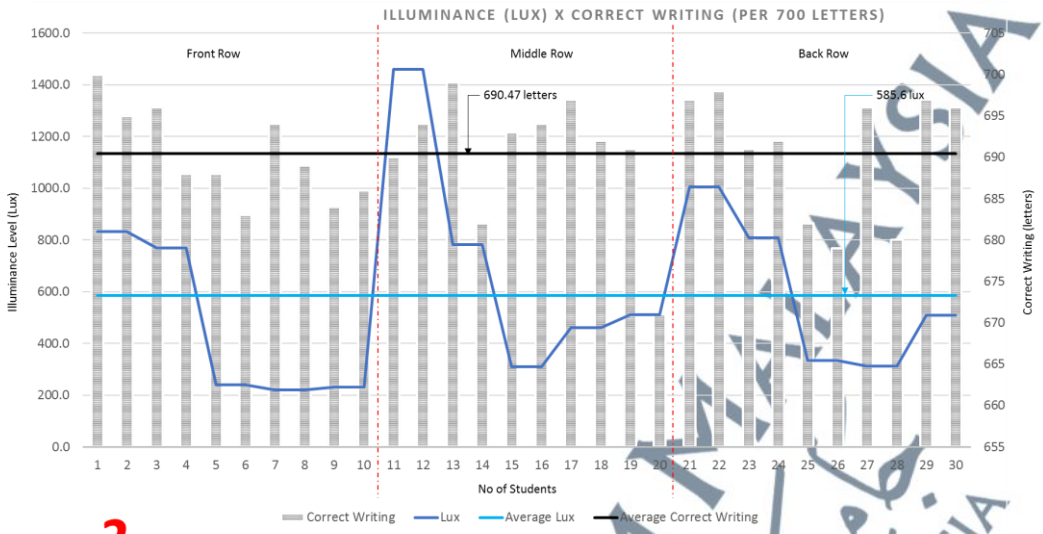
Average (wo student): 850.3 lux
Average (w student) : 766.4 lux



Classroom 1

Date : 15 Sept 2018
Classroom 2 - (1 Abu Bakar)

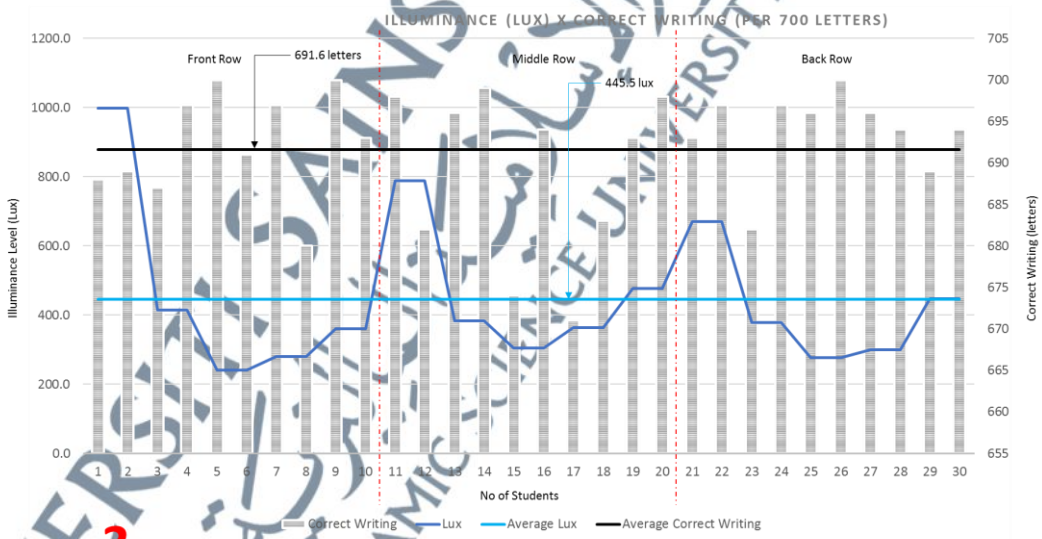
Average (wo student): 931.13 lux
Average (w student) : 586.6 lux



Classroom **2**

Date : 16 Sept 2018
Classroom 3 - (1 Abu Bakar)

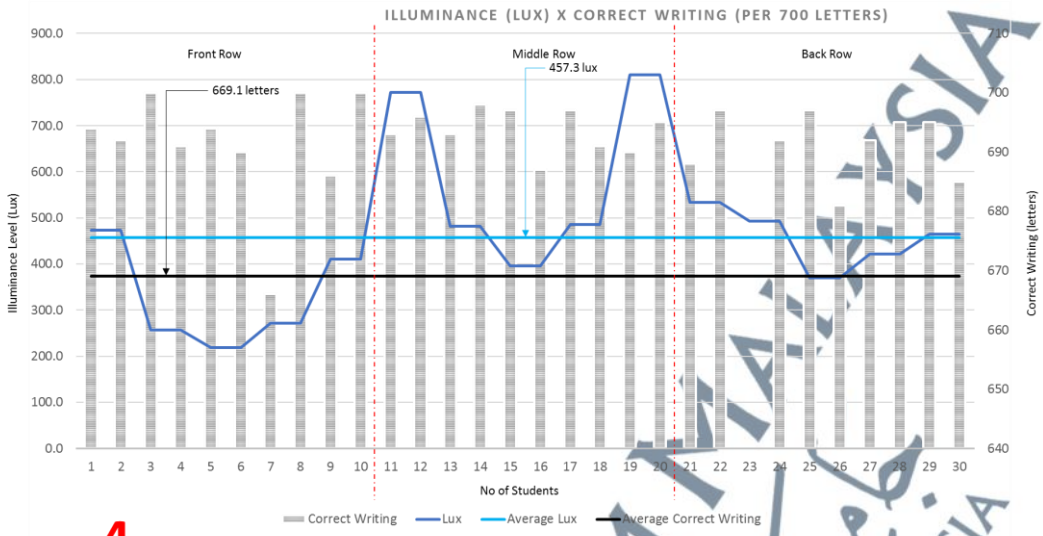
Average (wo student): 771.67 lux
Average (w student) : 445.53 lux



Classroom **3**

Date : 16 Sept 2018
Classroom 4 - (3 Umar)

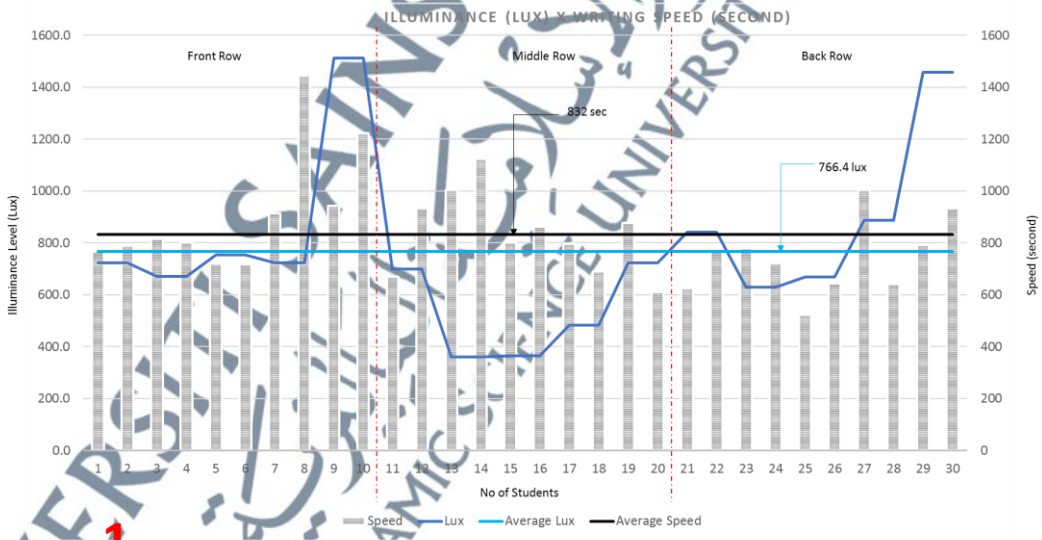
Average (wo student): 888.93 lux
Average (w student) : 457.27 lux



Classroom **4**

Date : 15 Sept 2018
Classroom 1 - (3 Umar)

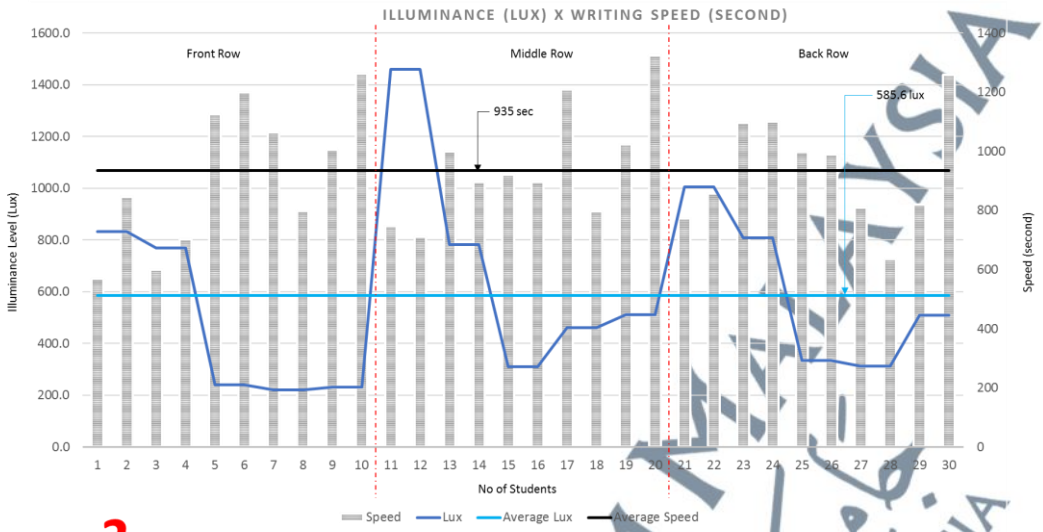
Average (wo student): 850.3 lux
Average (w student) : 766.4 lux



Classroom **1**

Date : 15 Sept 2018
Classroom 2 - (1 Abu Bakar)

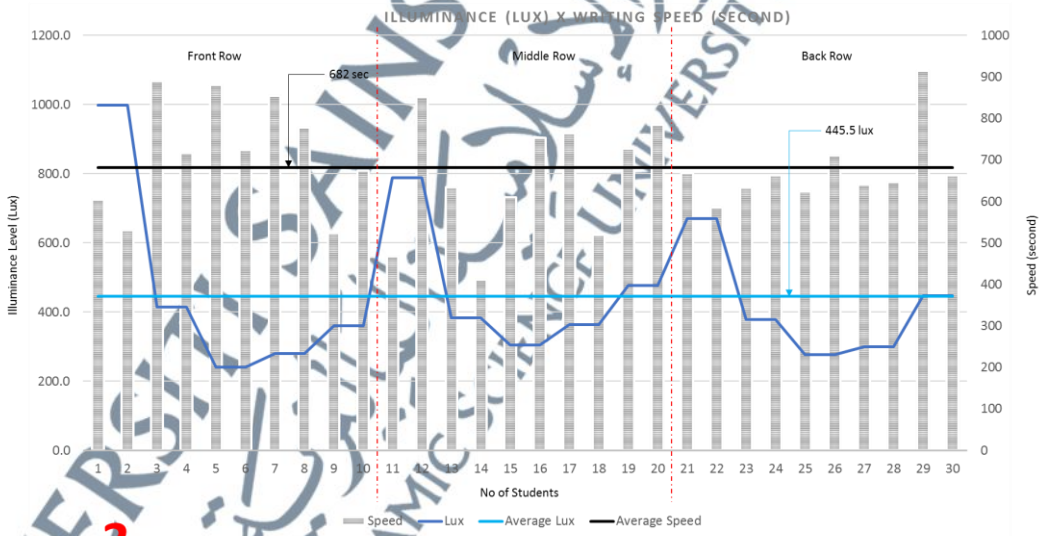
Average (wo student): 931.13 lux
Average (w student) : 586.6 lux



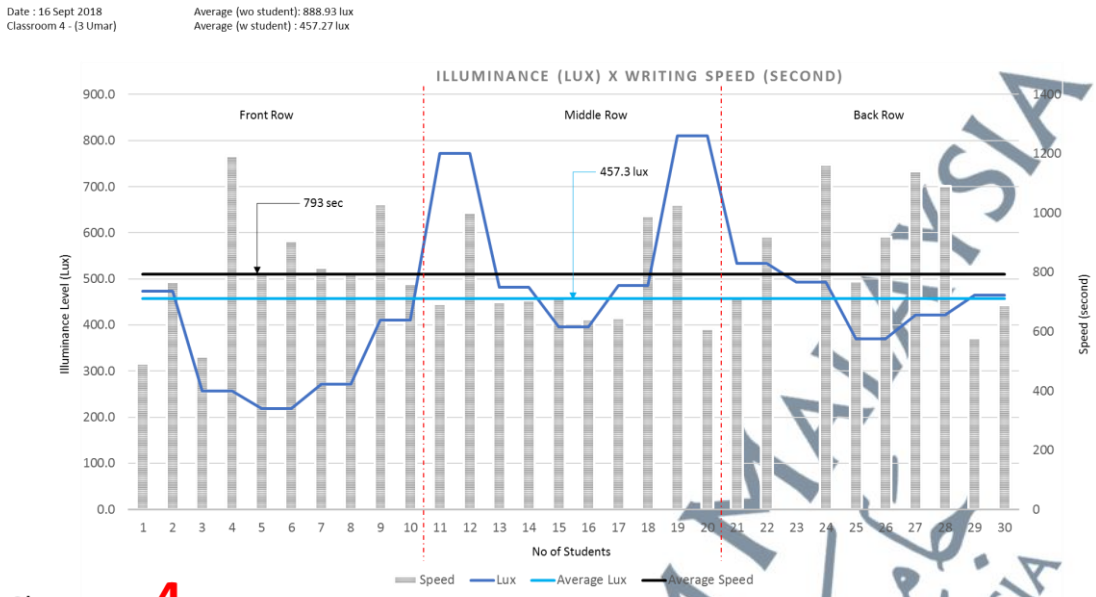
Classroom **2**

Date : 16 Sept 2018
Classroom 3 - (1 Abu Bakar)

Average (wo student): 771.67 lux
Average (w student) : 445.53 lux

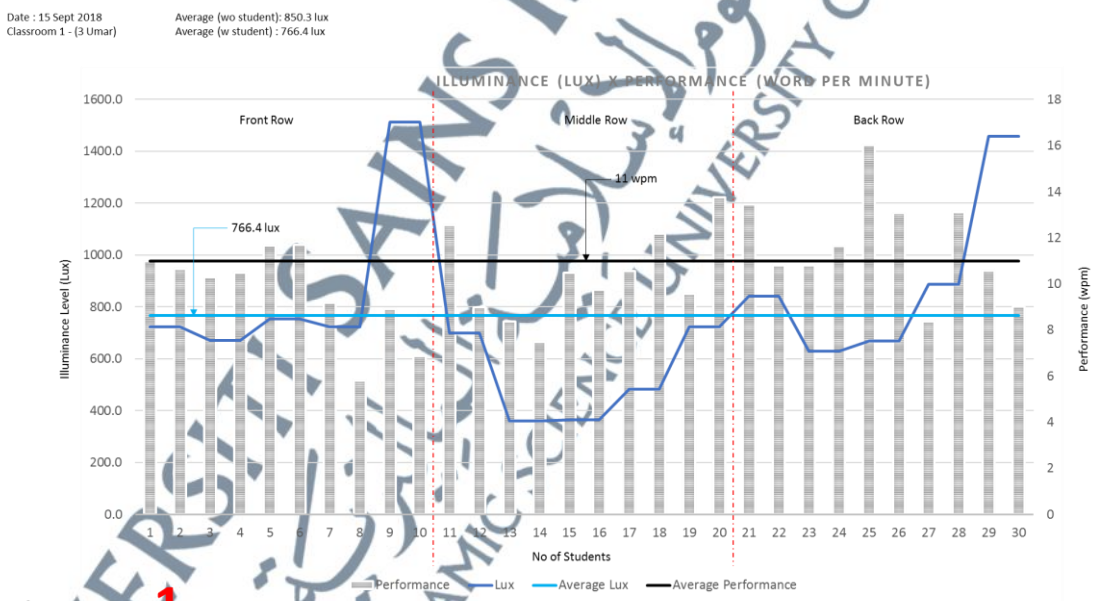


Classroom **3**



Classroom **4**

1



Classroom **1**

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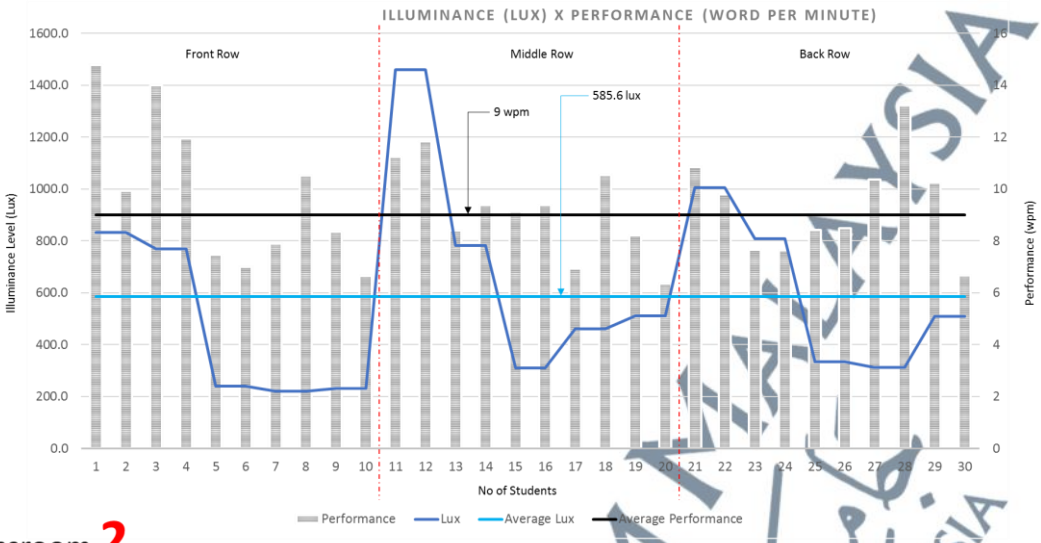
Classroom 2 - (1 Abu Bakar)

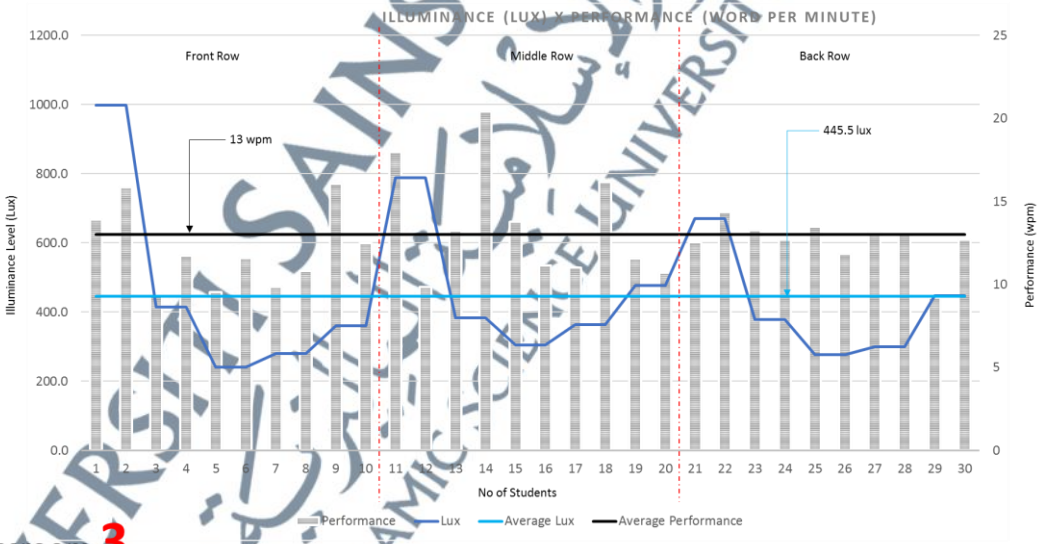
Average (wo student): 931.13 lux
Average (w student) : 586.6 lux



Classroom **2**

Date : 16 Sept 2018
Classroom 3 - (1 Abu Bakar)

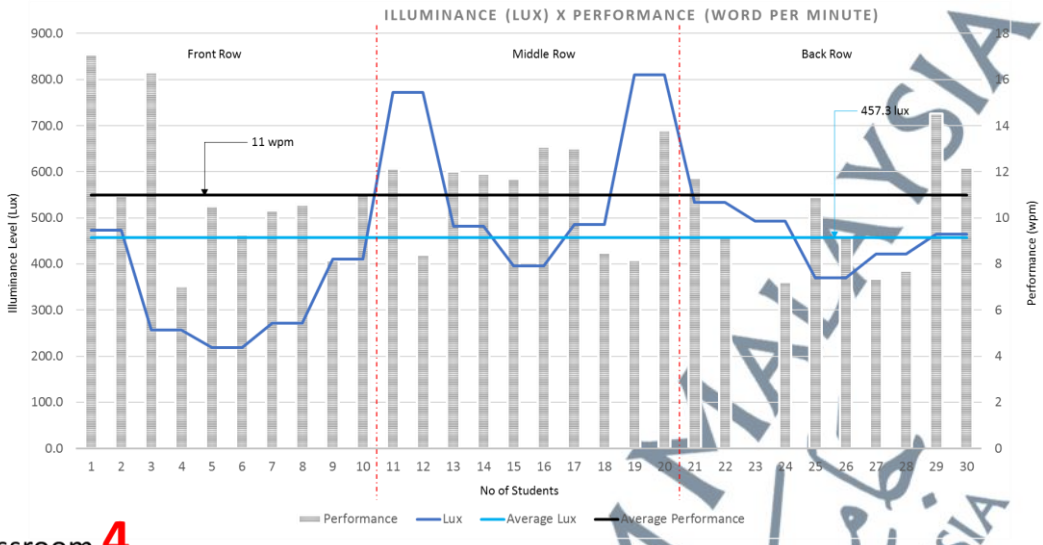
Average (wo student): 771.67 lux
Average (w student) : 445.53 lux



Classroom **3**

Date : 16 Sept 2018
Classroom 4 - (3 Umar)

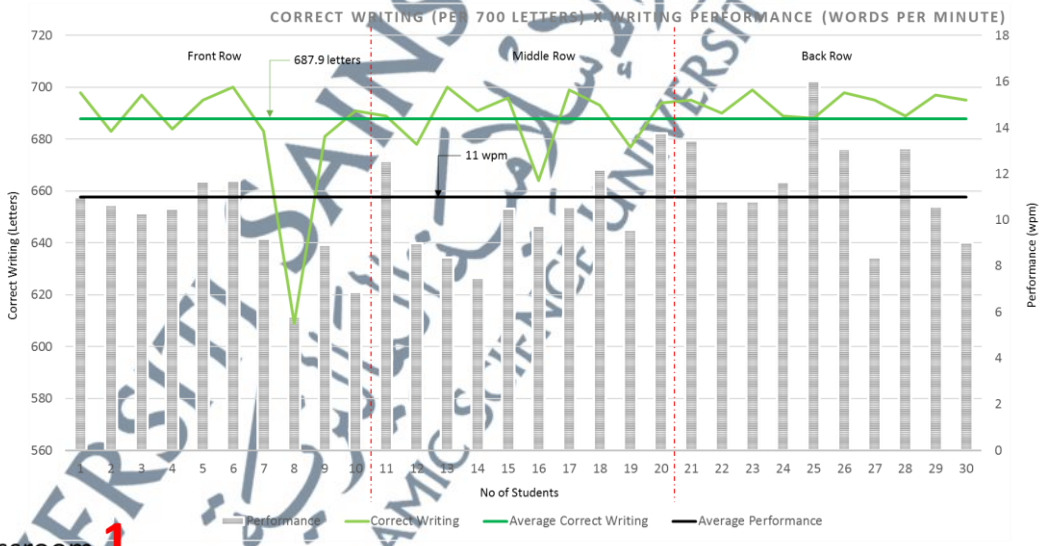
Average (wo student): 888.93 lux
Average (w student) : 457.27 lux



Classroom **4**

Date : 15 Sept 2018
Classroom 1 - (3 Umar)

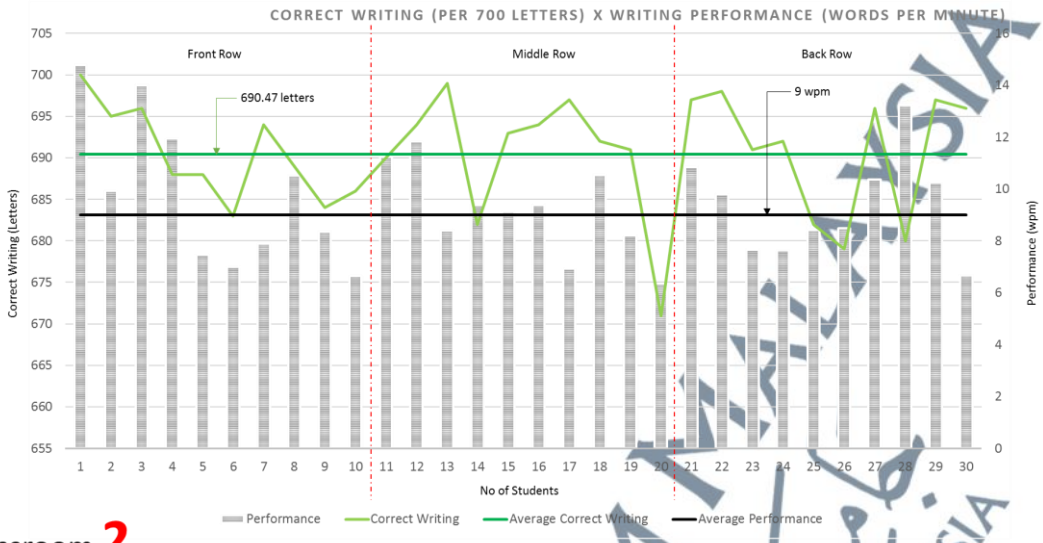
Average (wo student): 850.3 lux
Average (w student) : 766.4 lux



Classroom **1**

Date : 15 Sept 2018
Classroom 2 - (1 Abu Bakar)

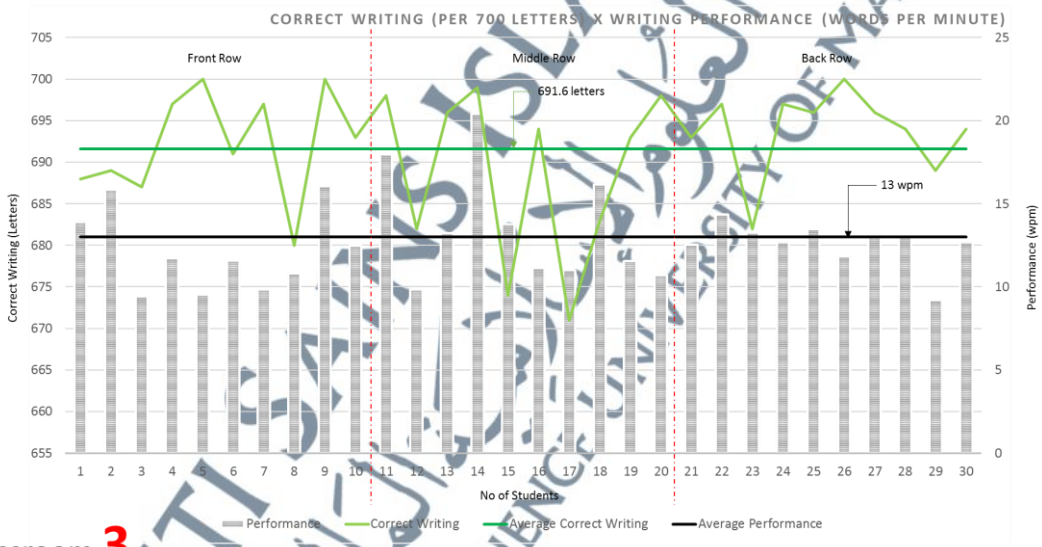
Average (wo student): 931.13 lux
Average (w student) : 586.6 lux



Classroom **2**

Date : 16 Sept 2018
Classroom 3 - (1 Abu Bakar)

Average (wo student): 771.67 lux
Average (w student) : 445.53 lux



Classroom **3**

Date : 16 Sept 2018
Classroom 4 - (3 Umar)

Average (wo student): 888.93 lux
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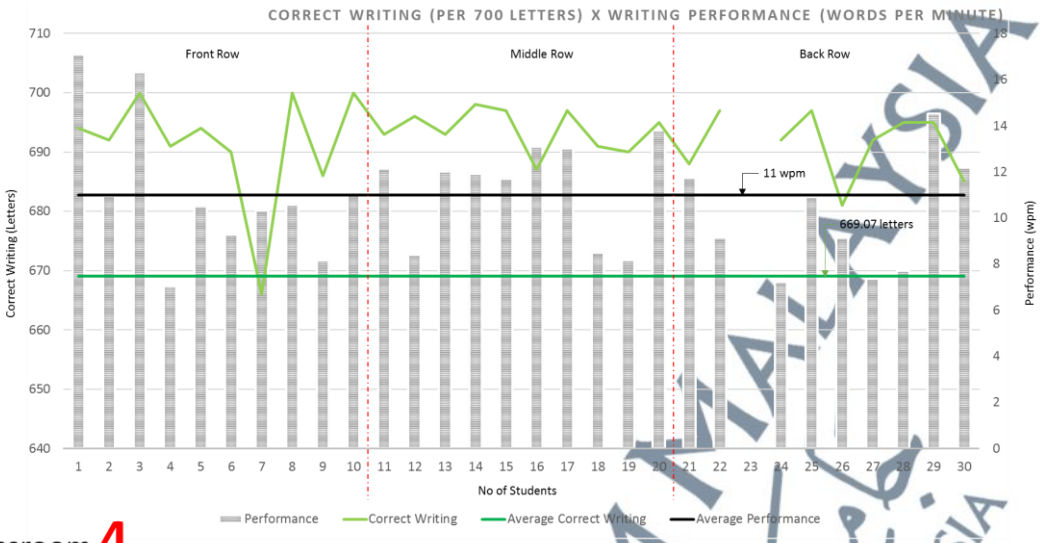
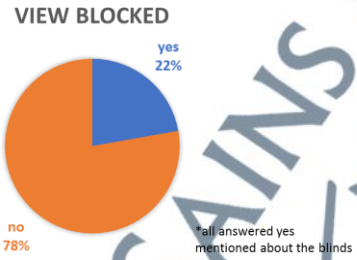


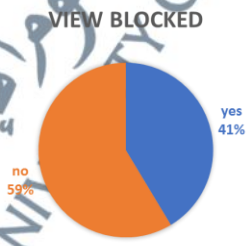
Classroom 4

Date : 15 Sept 2018 / Classroom 1 - (3 Umar) / Average (w student) : 766 lux



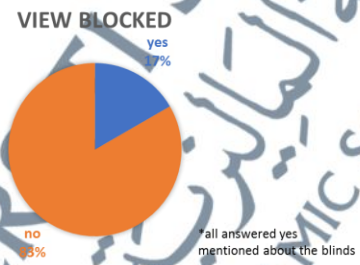
*all answered yes mentioned about the blinds

Date : 15 Sept 2018 / Classroom 2 - (1 A.Bakar) / Average (w student) : 586 lux



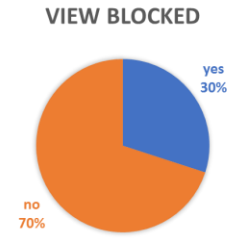
*all answered yes mentioned about the blinds

Date : 16 Sept 2018 / Classroom 3 - (1 A.Bakar) / Average (w student) : 446 lux



*all answered yes mentioned about the blinds

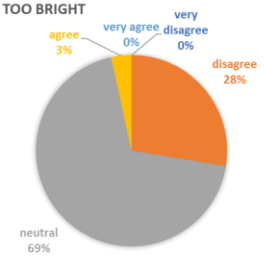
Date : 16 Sept 2018 / Classroom 4 - (3 Umar) / Average (w student) : 457 lux



*all answered yes mentioned about the blinds

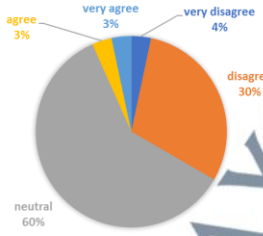
Date : 15 Sept 2018 / Classroom 1 - (3 Umar) / Average (w student) : 766 lux

ROOM TOO BRIGHT



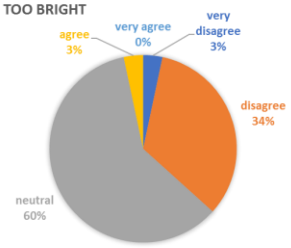
Date : 15 Sept 2018 / Classroom 2 - (1 A.Bakar) / Average (w student) : 586 lux

ROOM TOO BRIGHT



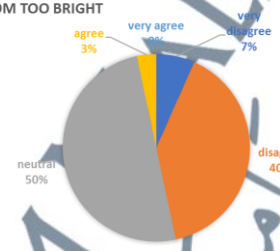
Date : 16 Sept 2018 / Classroom 3 - (1 A.Bakar) / Average (w student) : 446 lux

ROOM TOO BRIGHT



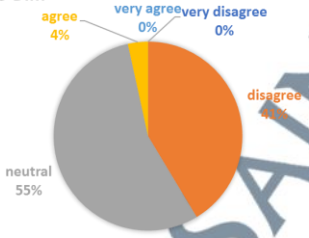
Date : 16 Sept 2018 / Classroom 4 - (3 Umar) / Average (w student) : 457 lux

ROOM TOO BRIGHT



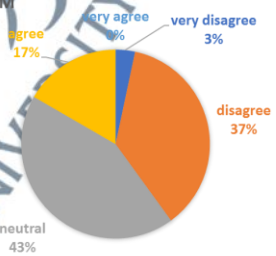
Date : 15 Sept 2018 / Classroom 1 - (3 Umar) / Average (w student) : 766 lux

ROOM TOO DIM



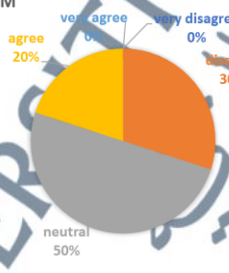
Date : 15 Sept 2018 / Classroom 2 - (1 A.Bakar) / Average (w student) : 586 lux

ROOM TOO DIM



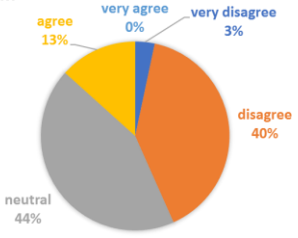
Date : 16 Sept 2018 / Classroom 3 - (1 A.Bakar) / Average (w student) : 446 lux

ROOM TOO DIM

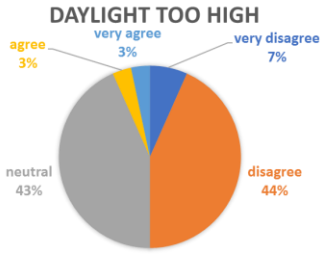


Date : 16 Sept 2018 / Classroom 4 - (3 Umar) / Average (w student) : 457 lux

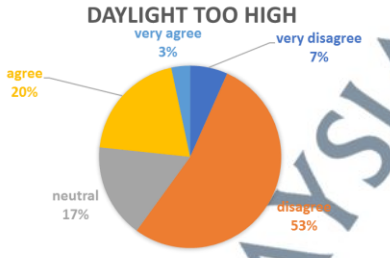
ROOM TOO DIM



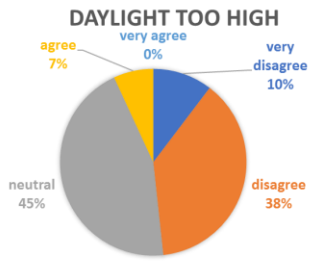
Date : 15 Sept 2018 / Classroom 1 - (3 Umar) / Average (w student) : 766 lux



Date : 15 Sept 2018 / Classroom 2 - (1 A.Bakar) / Average (w student) : 586 lux



Date : 16 Sept 2018 / Classroom 3 - (1 A.Bakar) / Average (w student) : 446 lux



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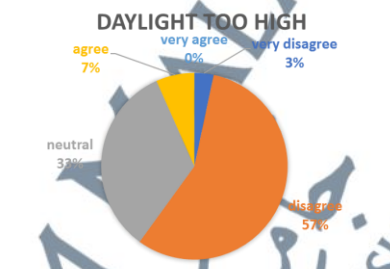

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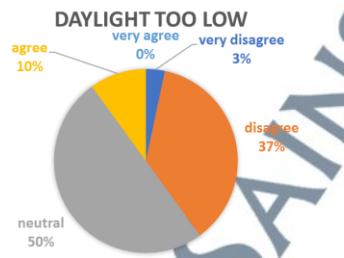

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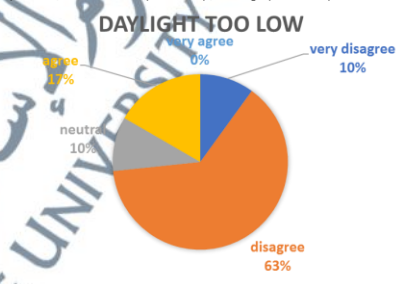

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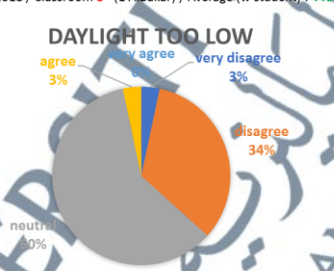

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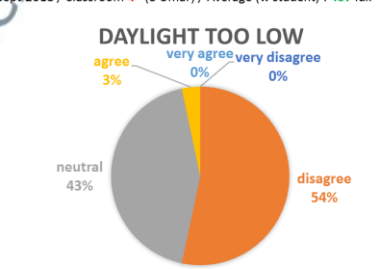

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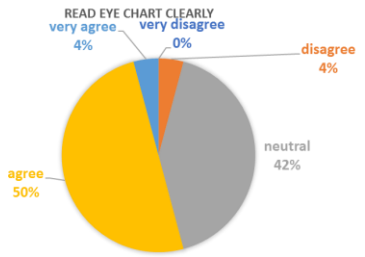

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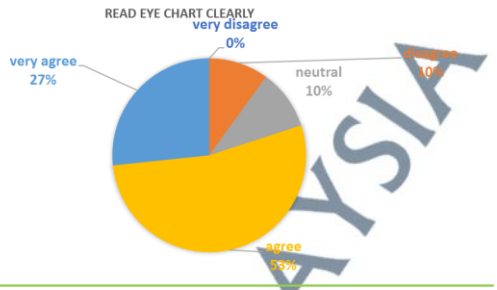

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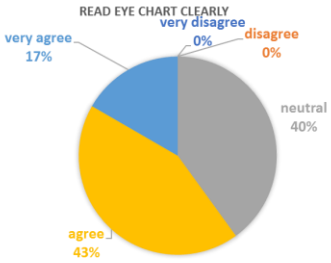

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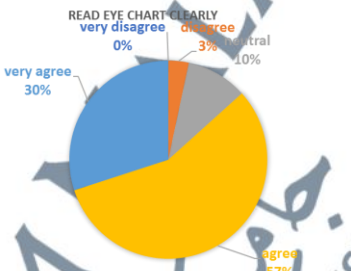

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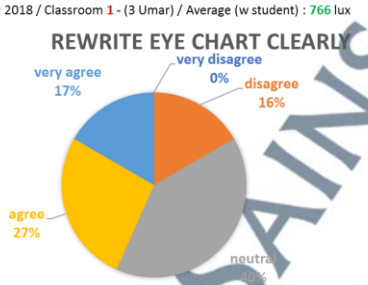

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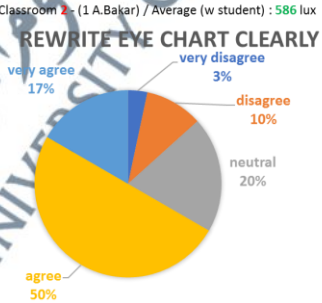

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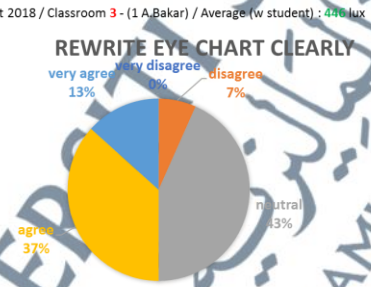

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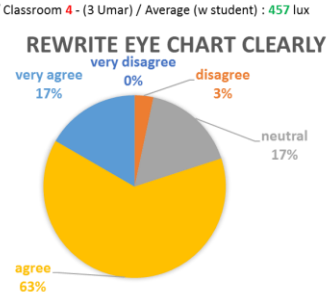

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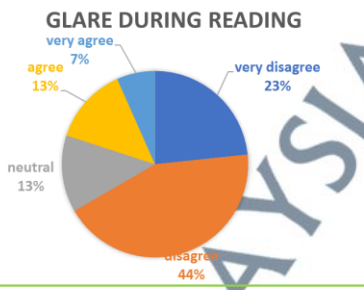

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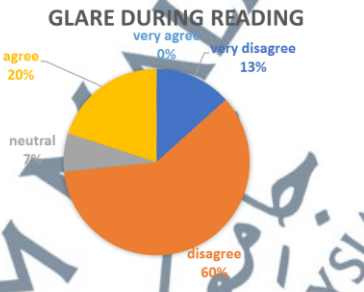

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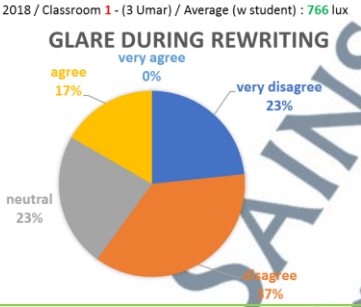

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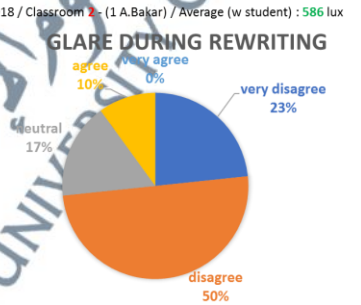

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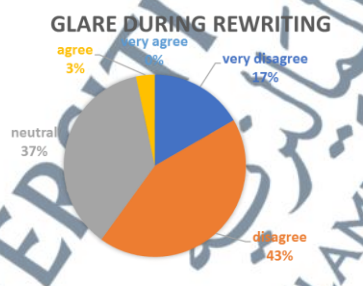

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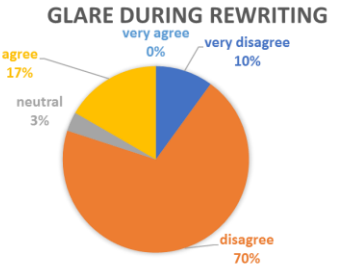
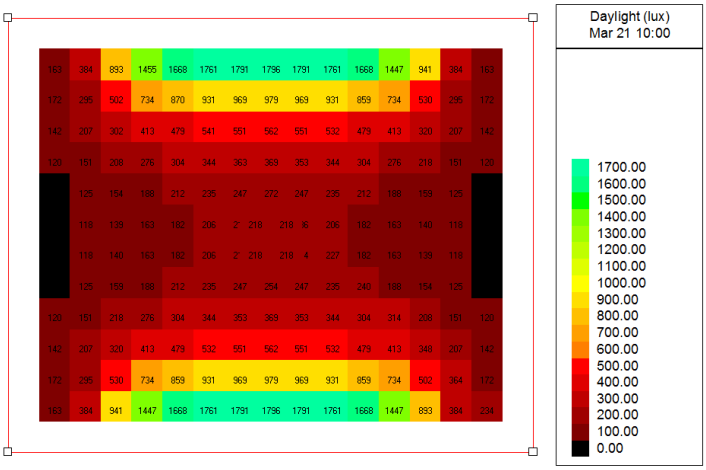
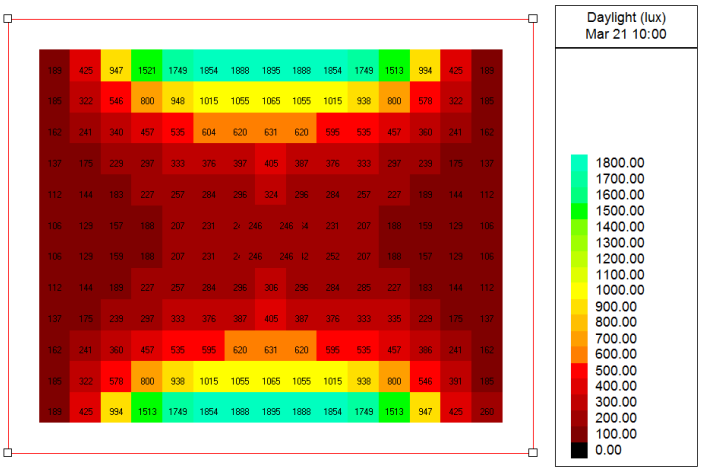
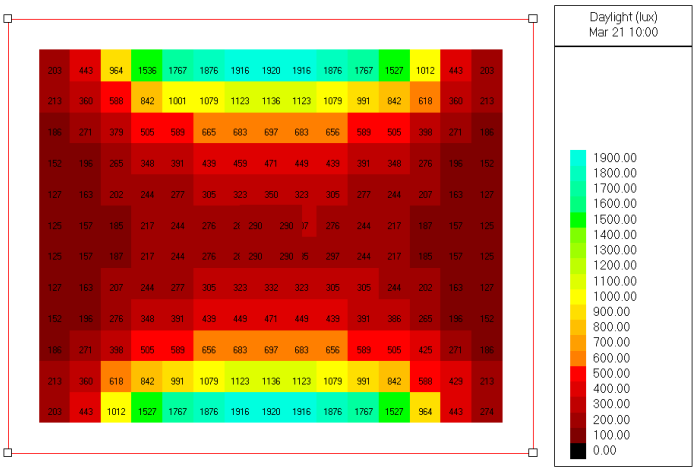


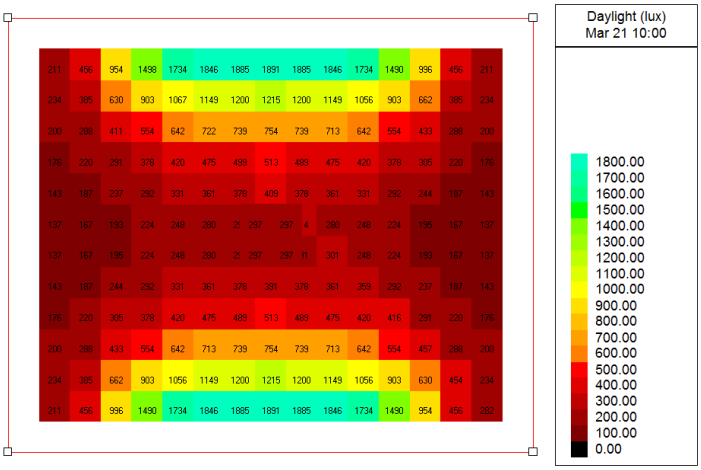
APPENDIX C

IESVE Simulation Parameter Setup Results





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1700.00
1600.00
1500.00
1400.00
1300.00
1200.00
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800.00
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400.00
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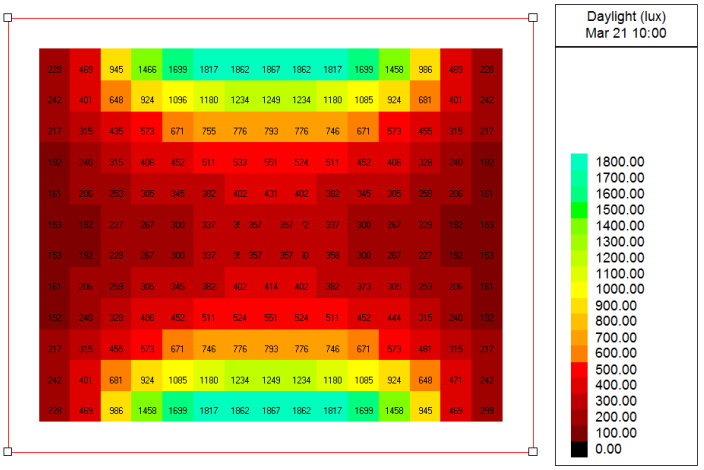
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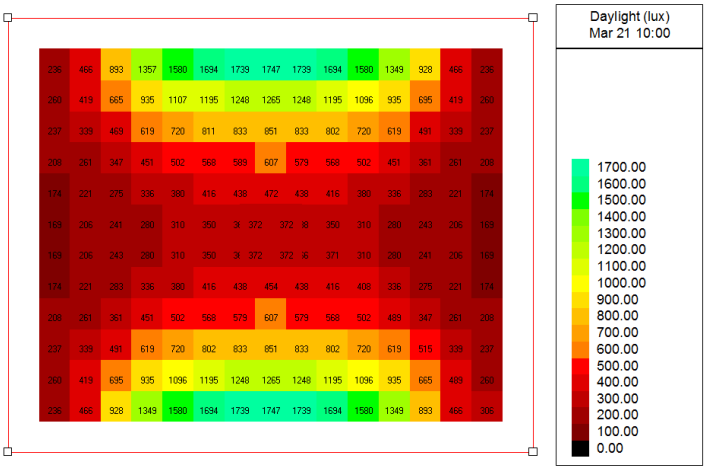
Daylight (lux)
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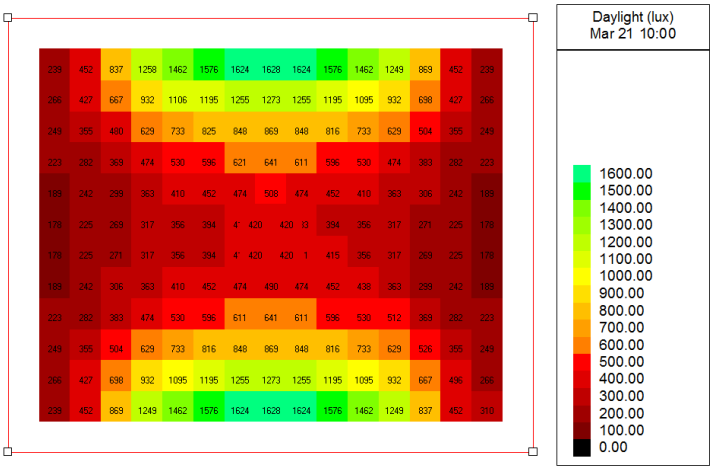
Daylight (lux)
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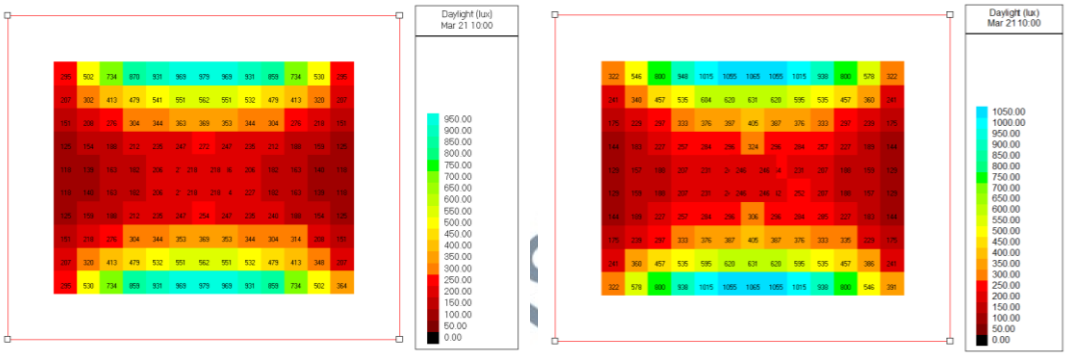
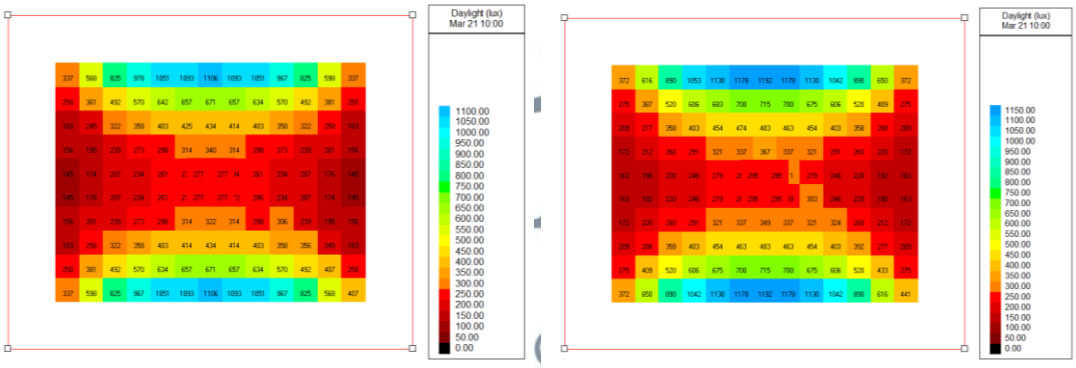

Daylight (lux)
Mar 21 10:00
Daylight (lux)
Mar 21 10:00


Daylight (lux)
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Daylight (lux)
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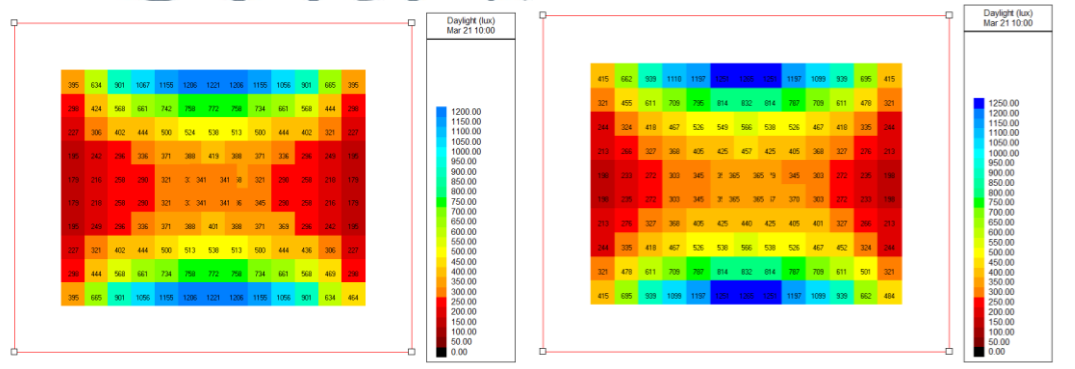
Daylight (lux)
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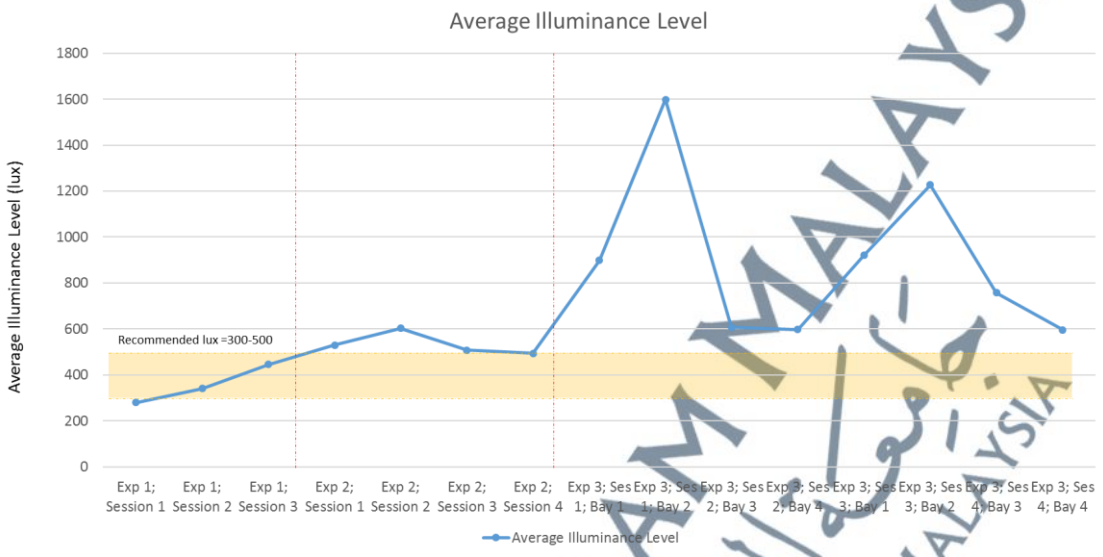
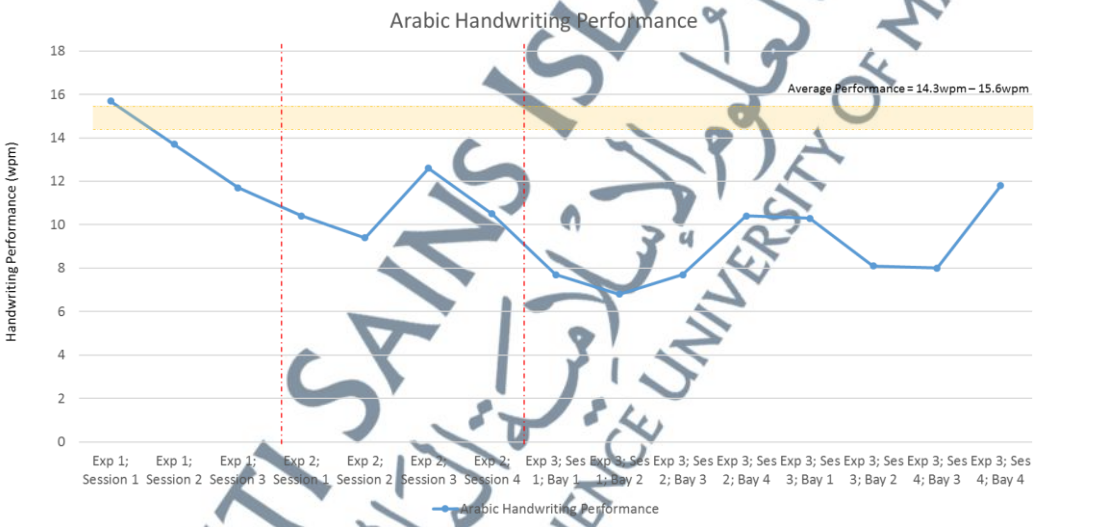
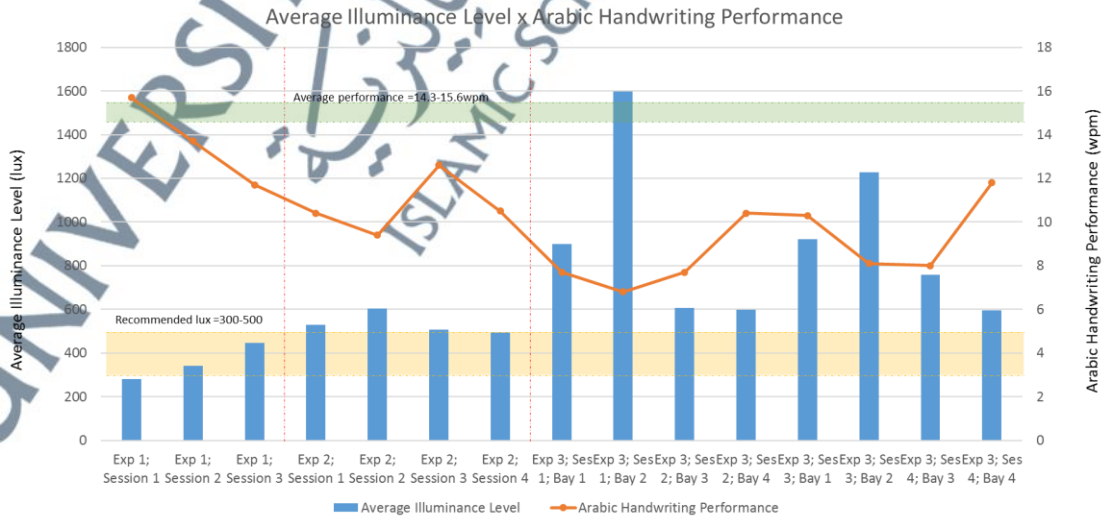
Daylight (lux)
Mar 21 10:00

APPENDIX D

Experiment Result Graphs







APPENDIX E

Publications

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http://iraj.in

ACCEPTABLE ILLUMINANCE LEVEL ATTRIBUTES TO LEARNING SATISFACTION IN CLASSROOM

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Abstract - The importance of student's satisfaction in school is to highlight the parameter that related to physical of buildings and learning area. Natural lighting is important to human where the daylight shall cause visual discomfort and performance in classrooms. Due to address the issue, the acceptable illuminance level is needing to be identified to increase performance in occupants' satisfaction. Illuminance level in learning spaces should not be neglected where in the form of human values, comfort and culture are to be focused as a main criterion in student's performance. Daylighting in an educational space can be improved in order to enhance the student's performance and promotes a better health and performance due to suitable level of visual comfort. The aim of this study is to investigate the student's performance in classroom with minimum performance zone in minimum Window-to-Wall Ratio (WWR). The physical conditions; WWR of less than 25%, to 40% of typical of classroom and illuminance level that ranged from 300-400 lux were identified to be sufficient daylight level. Pilot studies have been conducted in typical classroom of KolejPermataInsan where the effects of acceptable illuminance level that contribute to visual performance is identified. Qualitative survey has been conducted on the student's perception toward visual comfort and obtaining the comparison on performance from visual test. The illuminance level for the classroom was recorded using an LED data logger. Findings from the case study showed less than 20% openings in classrooms affect students minimum acceptable of illuminance level. There will significant contrast between internal luminance to external luminance if WWR is more than 70%. While the ideal WWR for classroom should be not more than 40% to achieve the optimum performance zone and acceptable illuminance level. The findings contribute towards the identification of an acceptable visual comfort ranges for students and design recommendations for optimum performance zone in a classroom in Malaysia.

Keywords - Keywords-visual comfort, acceptable illuminance level, performance zone, daylighting, classroom.

I. INTRODUCTION

Throughout the history of learning space design, especially in 19th century, the evolution of the space influenced by a few variables such as construction technology, government's policies, educational systems and many others. The design started with a single room building where the students are in one house and learns in a typical educational system, the term introduced by Robson (1874) was 'School House' [1]. After the years, integration of learning spaces with a larger institutional body with larger accommodations starts to become more viable due to increment of number of students in a classroom.
Usually the classrooms will be held in a large open plan area such as church's hall and community hall. Afterwards, typical modern schools are designed, which have a few classrooms in a single building that also caters for different education. The typical design changed when the educational system starts to change from students learning in one huge space into a smaller group of students [1].

II. LITERATURE REVIEW

2.1 Student's Performance

Efficient illuminance level through optimum daylighting in learning space can affect student's performance [2, 3, 4]. According to Heschong, a statistic investigation of standardized test scores of students shows that daylighting influences human behavior as well [2]. Mirrahimi stated that the student's health and performance can be increased by providing a sufficient natural lighting [4].
Shishegar stated that the student's alertness, cognitive performance, attention span and moods in classroom can be improved by optimizing natural lighting [5]. Al-Sallal through his findings in a classroom in United Arab Emirates (UAE) stated that the depth of the influence the daylight distribution [6]. Even though the Window-to-Floor Ratio (WFR) exceeds 20%, the daylight distribution is not acceptable due to the large depth of the classroom's layout design. According to Ibrahim, a sustainable element such as daylighting in classrooms can increase the student's performance if it is operated sustainably [7]. A study by Vi Le in a green school shows that the classrooms received mean illuminance level above recommended of 300lux, thus acceptable for teaching and learning [8]. According to Samani, inadequate illuminance level in classrooms resulted in sleepiness and loss of focus among the students [3].

2.2 Ranges of Preferred Illuminance Level and Discomfort Glare

Currently the range of preferred illuminance level in Malaysia is not well address especially for students with visual discomfort. Currently the guideline only

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Secondary school classrooms daylighting evaluation in Negeri Sembilan, Malaysia

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Abstract. Natural daylight is a renewable energy source that is important in photobiology study which looks into the effect of light to living organism. Students' visual comfort satisfaction due to efficient daylight in a classroom are highlighted in the physical of the building and learning space such as windows and openings. One of the factor that influences the design of classrooms environmental condition. Environmental condition consideration includes the daylighting requirement for classrooms. Various standards and guidelines on daylighting consideration have been developed in Malaysia including the recommendation on Window-to-Floor Ratio (WFR) and illuminance level. However, the recommended WFR may not achieve the recommended illuminance level. This paper evaluates whether the recommended WFR design achieve the recommended acceptable illuminance level. Two classrooms in Kolej Permata Insan, Nilai, Negeri Sembilan with different orientation were selected for the study. Integrated Environmental Solution (IESVE) simulation software is used for daylight evaluation. The WFR of the two selected classrooms were set to the recommended 20%. Simulation results shows that the illuminance level for both classrooms are higher than recommended. The simulation also shows that the daylight distribution in the classrooms are not uniform, thus creating inefficient daylight condition. Therefore, the WFR recommends further studies with additional of daylighting design strategy considerations.

1. Introduction

Learning spaces design has evolved throughout the years due to various reasons such as construction technology, educational systems, government's policies, space requirement and environment condition. Throughout the classroom design development, a concept of 'open-air design' was popularized. This concept shifted the focus of classroom design towards daylighting considerations because the concept allows too much daylight amount in the classroom that causes visual discomfort to the students [1]. Various research proven that sufficient daylight in a classroom is required due to its positive effect towards the students including improvements on learning performance, alertness, cognitive skills, behavior, mood, circadian rhythm, dental strength and productivity [2, 3, 4]. Thus, various standards and guidelines were introduced all around the world.

A REVIEW: INFLUENCE OF NATURAL DAYLIGHTING ON QURANIC MEMORISATION (HAFAZAN) LEARNING TASK

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rajanursyaheeza@gmail.com

ABSTRACT

In Islamic point of view and other monotheistic religion such as Christianity and Judaism, light has been described as a sacred element. Surah An-Nur in the Quran emphasised light as synonym to Allah's guidance. Interpreted by Buya Hamka, the first word of the first revelation "READ!" shows that in order to understand Islam, one must read and learn from the Quran. In Quran memorization (hafazan), the most acceptable method is reciting/reading and rewriting the verses. These methods or learning tasks are influenced by the daylighting condition of the classroom. Researches shows that sufficient daylighting improves the students' performance such as cognitive skills, mood, behaviour and alertness. Those are the reasons that daylight is important and need to be considered in educational spaces. This review paper includes literature review on the preferred learning task for hafazan and the effect of daylighting towards students' performance. The paper also refers to the traditional 'madrasah' method of hafazan, which uses a 'rehal' as practiced since the tenth century by the Seljuq dynasty. The recommended daylight in standards and guidelines are measured at 900 mm table height or working plane from floor level. Human ergonomics shows that clearance height for a cross-legged task is minimum of 300 mm, similar to the height of a 'rehal'. The difference of height between a modern table and a 'rehal' shows that the illuminance level measured will be different. In conclusion, further study should be established in order to identify the acceptable illuminance level at different working plane height.

Field of Research: *Daylighting, learning task performance, Hafazan, rehal, illuminance level.*

1. Introduction

Major monotheistic religion such as Judaism and Christianity show its respect towards the sacredness of light in their holy scriptures. Islam as a monotheistic religion also shows the same respect towards light, where surah An-Nur in the holy Quran is dedicated to the sacredness of it. In the surah, verse 35, Allah's guidance to His followers is exemplified as a light in a lamp (Gilavand, 2016). In science field, the study of light that influences living organism is called photobiology study. The study emphasised the importance of light towards human circadian system and visual comfort that leads to a better daily routine activity. This shows that Islam and science have common point of view in the importance of light to human being.

In other hand, Islam also emphasised the importance of reading. This is proven by Buya Hamka, an Islamic scholar, where the first word of the first revelation to Prophet Muhammad is "READ!". The first word in the surah Al-Alaq as described by Buya Hamka shows that in order to understand Islam, one must learn how to read and learn from the holy Quran for life guidance. Since reading task requires the human eye to function properly, it is highly related to light and visual comfort. Relating both surah An-Nur and Al-Alaq, plentiful of research have been established that shows sufficient daylight influences the human performance positively. Learning process including reading starts typically in a classroom or learning spaces. Thus, considerations of daylighting in a learning spaces is important in order to achieve an optimum learning environment.

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STUDENTS' DAYLIGHT CONDITION PERCEPTION IN TASMI' CLASSROOM

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Abstract

A renewable energy source that is important for human daily task performance is daylighting according to photobiologist. These daily task requires visual comfort for optimal performance such as writing and reading. These tasks are also commonly performed as educational process in learning spaces such as classrooms. Various research shows that the improvement of students' performance can be highly influenced by the improvement of daylighting as well. Learning spaces requires illuminance level between 300lux to 500lux based on recommendations in various standards and guidelines. Recent increment of more than 900 religious school establishment shows that the demand for Ulul Albab education among Malaysians increases since 2011. Tasmi' is one of the method used for Quran 'hafazan' (memorization) learning process as a part of Ulul Albab education. Kolej Permata Insan has adapted the Tasmi' method in their Ulul Albab education and as far as designing a Tasmi' classroom specifically for Quran 'hafazan' teaching. However, since the learning process follows a tradition of using a book rest or 'rehal', the illuminance level required for visual comfort and optimum learning task performance in the Tasmi' classrooms differs. The main focus of this research is to evaluate the students' perceptions on the daylight condition in the Tasmi' classrooms through data collected from the provided questionnaire. Results shows that all of the classrooms exceeds the recommended illuminance level. Thus, this reduces the students' visual comfort based on the result of the questionnaire on the students' perception. Further study for Tasmi' acceptable illuminance level is required.

Keywords: Illuminance level, daylighting, Tasmi' classroom, students' perception.

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ILLUMINANCE LEVEL AND ARABIC HANDWRITING PERFORMANCE AT LOWER WORKING PLANE HEIGHT

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Abstract

Renewable energy such as natural daylight is an important element that influences students' task performance such as reading and writing in schools. Research shows daylight can improve the students' performance in classroom. Acceptable illuminance level recommended by guidelines in the world for learning space is between 300 lux to 500 lux. The illuminance level is measured at the working plane 800mm to 900mm table height, where the window sill height is at the similar height. However, Ulul Albab education traditionally uses a book rest or 'rehal' for Quran 'hafazan' (Quran memorization) that requires Arabic handwriting tasks at working plane height between 250mm to 300mm. Focus of the paper is the students' Arabic handwriting performance at lower working plane height in classroom. The classroom selected in Kolej Permata Insan can seat 24 students based on the ratio of 2.5m2 floor area per student. The students using 'rehal' at working plane height of 300mm required to handwrite the modified Balsam Alabdulkader-Leat (BAL) eye chart to evaluate their performance based on word per minute (wpm). Results shows that students' Arabic handwriting performance in classrooms with average illuminance level of 603 lux and 494 lux measured at 300 mm working plane height were lower compared to the average of 13.7 wpm to 14.5 wpm. Thus, the average illuminance level measured at 'rehal' 300mm working plane height in existing classrooms were not suitable for Arabic handwriting task.

Keywords: Illuminance level, daylighting, working plane height, 'hafazan' education, students' performance.

APPENDIX F

Awards


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