ANALYSIS OF DAYLIGHTING IN ARCH STUDIO

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*Abstract :*The use of both natural and artificial lighting has a significant impact on the visual comfort and ambiance of a space. The purpose of the study is to identify and evaluate daylight conditions in architectural studio in Periyar Maniammai University with relation to openings and orientation of spaces to daylight received. Data were collected through observation to Obtain information about the room's physical characteristics and the lighting scheme in use. Lux Meter is used to measure the lighting performance. User's perception about the room quality is obtained. The outcomes reveal that responders are still well-informed despite the below-average illumination level rated the studio lighting quality. Here for the arch studio Visual comfort perception is higher than the room atmosphere perception. The many lighting methods, light sources, light colours, room reflection elements, and daylighting contribution are the main factors that mostly affect the room quality.

***Abstract: IndexTerms* - Component,formatting,style,styling,insert.**

I. INTRODUCTION

Studio is the most important space in architecture education because it is where architectural students develop their learning processes such as draught, design, and visual composition. Lighting is one of the factors that affect the quality of the indoor environment. It is also used efficiently to maximise occupant comfort while conserving energy. It is very important to the student because the design studio is very important in architectural studies, and it is used for a longer period of time than other classrooms. As a result, lighting quality is an important consideration when it comes to improving user comfort and creating an interesting atmosphere. The architectural design studio at Periyar Maniammai University in Thanjavur was used as a case study. Because the studio has limited access points, only a portion of the space receives natural light. This study aims to explore and assessing the studio's lighting layout and making suggestions to enhance the lighting's quality, which might affect students' learning productivity and creativity.

II. LITERATURE SURVEY

1.1. PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY, THANJAVUR.

Fig 1.1(source: Google earth)

Location – Periyar Maniammai Institute of science & technology, Thanjavur.
Climate - Warm and humid climate. **In Thanjavur, the highest average yearly temperature is 39.3°C (102.7°F)** .Thanjavur's average low temperature is 20.5°C (68.9°F). **Overall built-up area-** 243.30 sq. m

1.2. GENERAL VIEW

1.2.1. Orientation of Window & Arrangements:

- The building's entrance is situated in the north. Additionally, it has an atrium and a central courtyard that measures 23.84 m x 26.09 m. likewise has a 2.4 m wide corridor. The atrium and courtyard are the studio's primary sources of natural light. The studio, which has a nearly rectangular floor plan and a height of 3.00 metres, is flanked by rows of windows, each

ventilation that measures 0.61 by 0.81 metres in length and width. Each studio has a maximum of three windows and ventilations above it on either side. The main entrance and the circulation path are divided into two areas.

- The ceiling was painted white without primer, the walls were painted white with a standard concrete finish, and a ventilator with an opaque layer of glazing transmits 40% less light than windows with a single transparent layer of glazing that transmits 90% of the light.

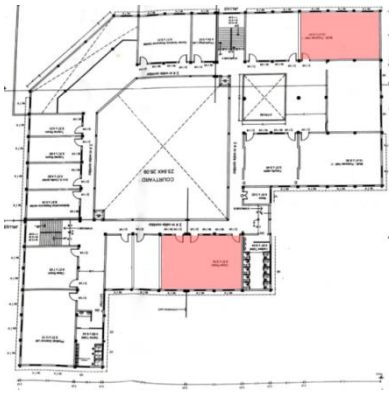


Fig1.2a: Ground Floor Plan from PMIST PMIST Architecture Block

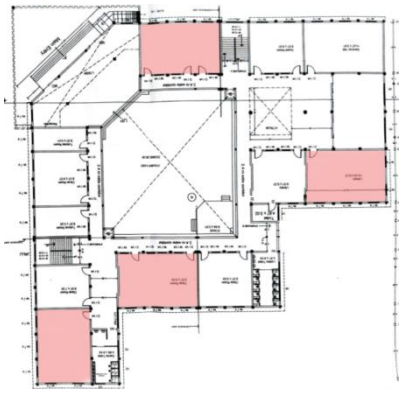


Fig1.2b: First Floor Plan from PMIST Architecture Block

1.2.2. Architectural studios are divided into categories based on their orientation and the presence of corridors, courtyards, and atriums around them.

Orientation	South east	North east	North	South	South West
Classrooms	1A	2A	3A	4B	4A
	3B	-	-	-	-
	-	-	-	-	-

Table 1.1

1.2.3. STIMULATION RESULT:

With the help of the daylight factor, room depth, and glare index, the effectiveness of daylighting was evaluated.Illuminance data is obtained from simulating software and used to frame analysis for the collected data. Model simulation in an analysis programme using Design Builder and the Radiance plug-in software Based on window orientation in classrooms, the results of the daylight analysis from the following are categorised.

STUDIO 1
Area: 14.47m x 9.54m
Orientation: South east

Lighting: Natural light from southern hemisphere and from northern hemisphereThrough the window and ventilation to the oriented Fenestration receive diffuse skylight and provide the space with a daylong consistent light source that is both functional and aesthetically pleasing.

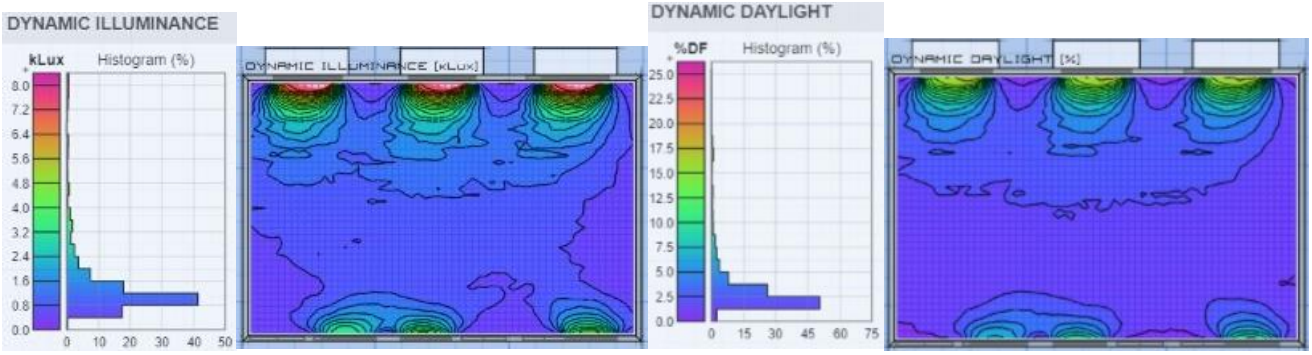


Fig 1.3 a Illuminance (LUX)

Studio Iyr Sec A

Fig 1.3b Daylighting (DF)

Classroom	Dynamic illuminance(lux)			Dynamic daylight(DF)		
1A	Min	Average	Max	Min	Average	Max
	390	1490	8620	0.96 %	3.31 %	18.56 %
Lux & DF in the studio(50%)	500 – 1000 (42 %)			0.5 – 2.5 (42 %)		

Table 1.2

Fig1.4aFig 1.4b

Fig 1.4 c

Fig 1.4 d

STUDIO 2

Area: 14.47m x 9.46m

Orientation: North East

Lighting: Natural light from northern hemisphere to the Oriented fenestration receive diffuse skylight They offer a consistent, useful, and aesthetically pleasing light source for the inside.

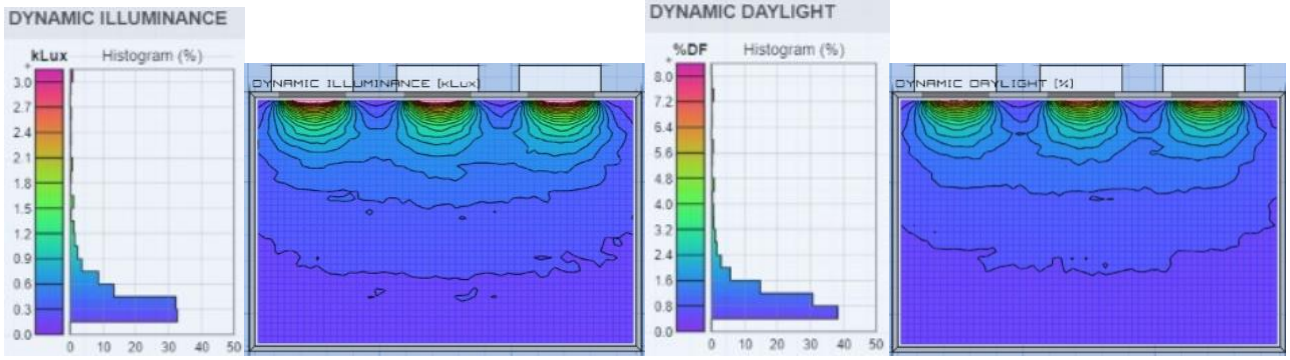


Fig 1.5 a Illuminance (LUX)

Studio IIyr Sec A

Fig 1.5b Daylighting (DF)

Classroom	Dynamic illuminance(lux)			Dynamic daylight(DF)		
2A	Min	Average	Max	Min	Average	Max
	200	520	341	0.52 %	1.24 %	7.69 %
Lux & DF in the studio (50%)	520 (27.61 %)			0.52 % (27.61 %)		

Table 1.3

Fig 1.6a Fig 1.6b

Fig 1.6c Fig 1.6d

STUDIO 3
Area: 14.47m x 8.91m
Orientation: North
Lighting: Natural light from northern hemisphere and from southern hemisphere through central court yard to the oriented fenestration receive diffuse skylight and provide the interior with a functional Throughout the day, consistent light that is aesthetically pleasing is provided.

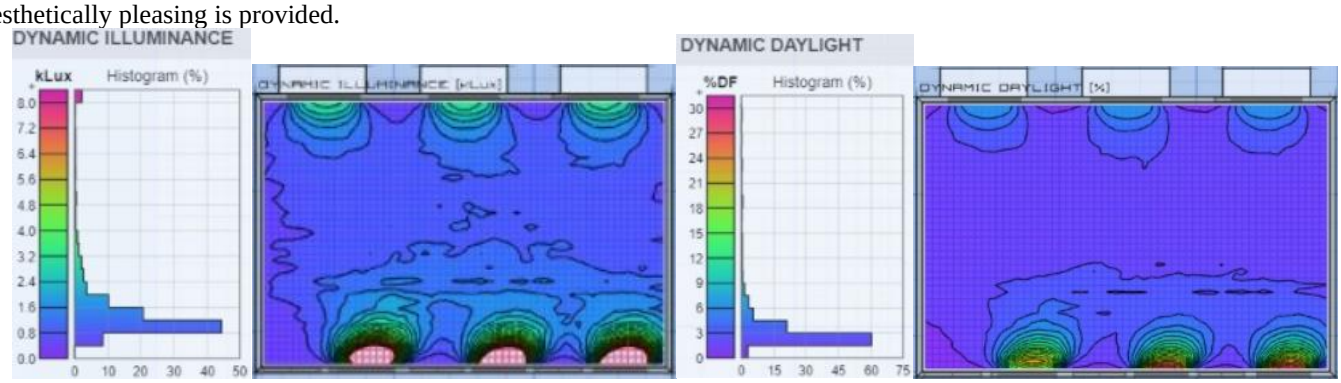


Fig 1.7 a Illuminance (LUX) **Studio IIyr Sec A** Fig 1.7b Daylighting (DF)

Classroom	Dynamic illuminance(lux)			Dynamic daylight(DF)		
3A	Min	Average	Max	Min	Average	Max
	460	1660	13770	1.14 %	3.71 %	29.58 %
Lux & DF in the studio (50%)	1050 (30 %)			1.05 % (27.61 %)		

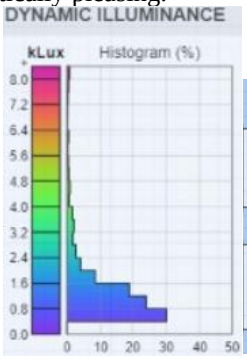
Table 1.4

Fig 1.8a Fig 1.8b


Fig 1.8c


Fig 1.8d

STUDIO 4
Area: 14.47m x 9.46m
Orientation: South East
Lighting: Natural light from east hemisphere and from southern hemisphere and from central court yard through the entry to the oriented fenestration receive diffuse skylight and provide the interior with a daylong consistent light that is both utilitarian and aesthetically pleasing.



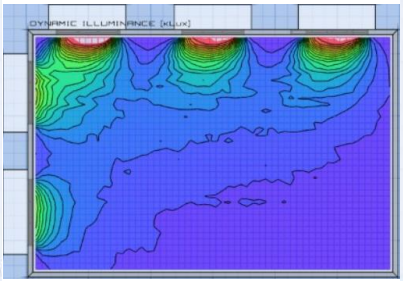
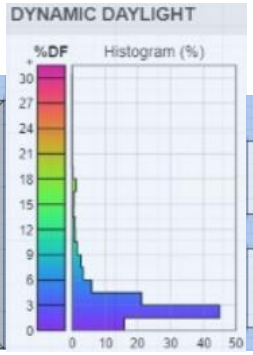


Fig 3.9 a
Illuminance (LUX)

Studio IIyr Sec B



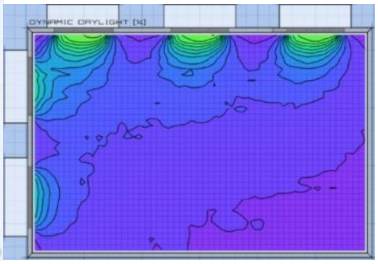


Fig 3.9b
Daylighting (DF)

Classroom	Dynamic illuminance(lux)			Dynamic daylight(DF)		
3B	Min	Average	Max	Min	Average	Max
	420	1550	8790	1.04 %	3.45 %	18.93 %
Lux & DF in the studio (50%)	960 (28.86 %)			0.96 % (28.86 %)		

Table 1.5


Fig 1.10a


Fig 1.10b


Fig 1.10c

STUDIO 5
Area: 14.60m x 9.50m
Orientation: South
Lighting: Natural light from both southern hemisphere and northern hemisphere and also from central court yard through the entry to the oriented fenestration receive diffuse skylight and provide the interior with a functional and visually comfortable light which stays constant all day long.

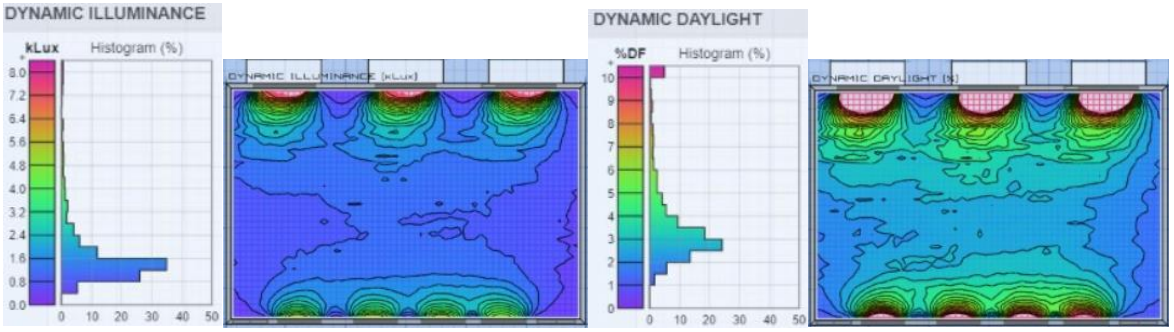


Fig 1.11 a Illuminance (LUX) **Studio IVyr Sec B** Fig 1.11b Daylighting (DF)

Classroom	Dynamic illuminance(lux)			Dynamic daylight(DF)		
4B	Min	Average	Max	Min	Average	Max
	500	1780	8650	1.25 %	3.98 %	18.66 %
Lux & DF in the studio (50%)	1170 (30.90 %)			1.17 % (30.90 %)		

Table 1.6

Fig 1.12a Fig 1.12b

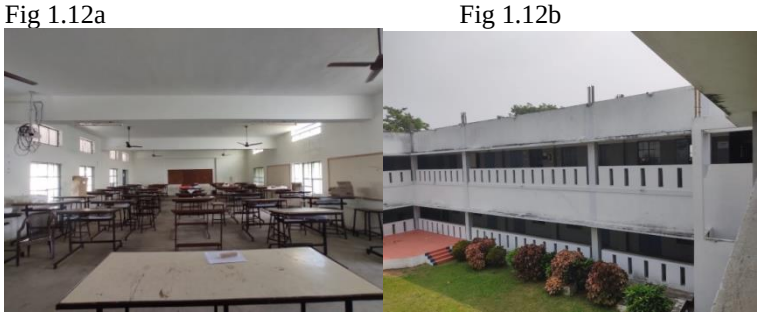


Fig 1.12c Fig 1.12d

STUDIO 6

Area: 14.60m x 9.50m

Orientation: South West

Lighting: Natural light from both southern hemisphere and from west side to the oriented fenestration receive diffuse skylight they offer a consistent, daylong light that is both functional and aesthetically pleasing for the interior.

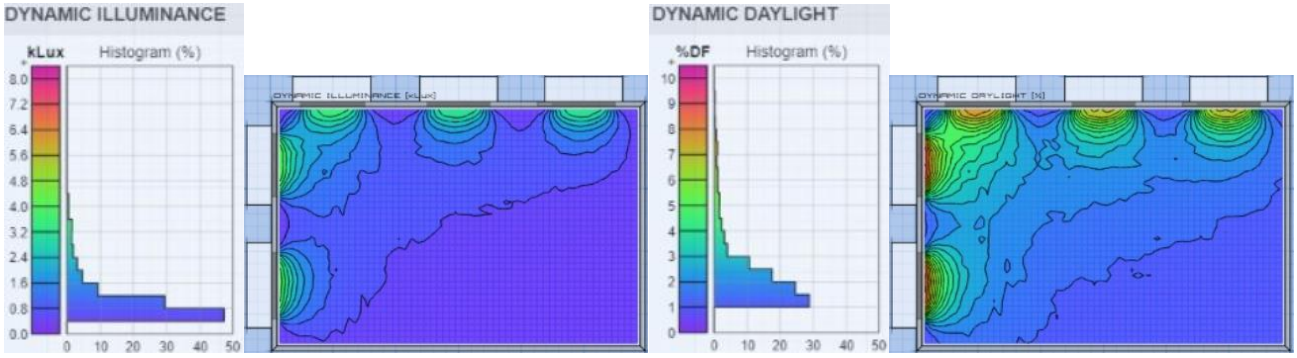


Fig 1.13 a **Studio IVyr Sec A** Fig 1.13b

	Illuminance (LUX)			Daylighting (DF)		
Classroom	Dynamic illuminance(lux)			Dynamic daylight(DF)		
4A	Min	Average	Max	Min	Average	Max
	420	1040	4390	1.04 %	2.38 %	9.52 %
Lux & DF in the studio (50%)	960 (28.86 %)			0.96 % (28.86 %)		

Table 1.7

Fig 1.12a

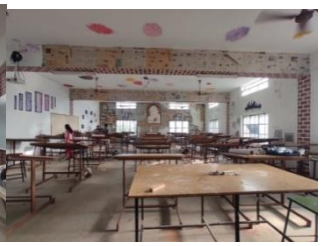


Fig 1.12b

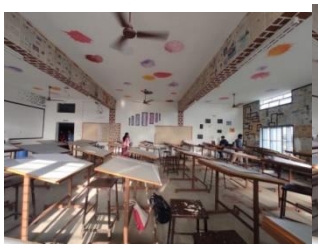


Fig 1.14c

Fig 1.14d

III. CONCLUSIONS

According to the study's findings, the Periyar Maniammai Institute of Science and Technology's architectural studios have different Lux levels. After analysing the results of the simulation, it was discovered that studios at PMIST Lux levels fall short of ideal illumination levels. Interior spaces are relatively typical when lighting levels are optimally bright between two and three metres from windows. Recommendations include installing skylights, upgrading the number and width of fenestration, limiting the length and angle of overhangs, to improve daylight conditions. contrasted with other studios The lighting in Studio 5 (IV B) is appropriate. The lighting in studios 3 and 6 is also good.

IV. REFERENCES

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