

Classroom Furniture: How Suitable for Students

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ABSTRACT The study was undertaken to study the Indian classrooms. The sample consisted of 20 classrooms which included 2 classrooms taken from each of the 10 colleges. Data was collected using a record sheet for preliminary survey and an interview schedule for the main survey of student respondents. The results revealed that only 10 per cent of the classrooms were having appropriate door location and 80 per cent of the classrooms had windows placed at the side. The number of ventilators was not sufficient in the classrooms and the placement of these ventilators was also not appropriate. The number of lighting sources was sufficient in the classrooms but these were not evenly distributed according to the work zones. The wall finish was not appropriate in the surveyed classrooms while the ceiling was up to the standards. The main survey revealed that the overall suitability of the classroom furniture was 50 per cent.

INTRODUCTION

The issue of the quality of working life will become the major concern of the people of India in the coming few decades because of fast growing intellectual sector. The intellectuals are not built in one day. Acquiring knowledge and learning starts the day child joins school and later up to the higher education. For them, most surrounding work environment is the learning space. Learning is no longer considered merely an accumulation of knowledge but rather, the understanding or ability to construct knowledge in meaningful ways for a particular purpose or solution to a well-defined problem. If all these aspects are thoroughly considered, the new learning environment will enhance, not hinder the learning process. However, till now little interest has been shown in the largest learning place of these intellectuals, that is, the classroom.

Classroom is a place where students spend most of their time. As they have to spend considerable amount of time on studies, provision for good study facilities becomes essential. Various architectural features, interiors and furniture of the classroom is an important determinant of learner's comfort possibly affecting his work performance. Architectural features like doors, windows, ventilators, fans and fluorescent tubes along with elements of interior enrichment like the colour and texture of walls, flooring and ceiling has to facilitate learning and increase the work efficiency of the students through providing a comfortable and stress-free

working environment suitable for intellectual activities. The task performance gets influenced to a great extent by the design and colour of the physical facilities provided at workplace. Besides, furniture suitability is one of the key elements to enhance learning capability, thought and concentration. Classroom ergonomics is an important aspect of preserving not only the health and well being but also ensuring academic success and achievement.

In India, so far this field has not been explored fully and to facilitate learning, schools must also encourage a good physical class-room environment. Therefore, it was considered worthwhile to document elements of interior environment of the Indian classrooms and their suitability to the students. The present study was conducted with the following objectives:

1. To study various architectural features present in the selected classrooms
2. To study various elements of interior enrichment in the selected classrooms
3. To evaluate the suitability of classroom furniture to students.

MATERIAL AND METHODS

Locale of the Study

The study was conducted in Ludhiana city.

Sample Selection

A total sample of 10 girls' colleges was locally and randomly selected for the preliminary

classroom survey from which two classrooms were selected from each college, making a total of 20 classrooms. Subjective responses were gathered from 320 respondents, randomly selected from 20 classrooms (16 users from each classroom).

Data Collection

A record sheet was constructed for the preliminary classroom survey and a separate interview schedule in the form of a three point continuum scale was constructed for gathering subjective responses regarding the suitability of classroom furniture to students. The subjective responses of students regarding the suitability of classroom furniture were recorded on a three point continuum scale.

Analysis of Data

Data was analysed using suitable statistical tools like frequencies and percentages. The subjective responses were evaluated on a three point continuum scale with three levels of agreement as “Strongly Agree”, “Agree” and “Disagree” with assigned scores of 3, 2 and 1 respectively.

Assigned score values for agreement to these statements by respondents are as following:

Variable	Assigned score
Strongly Agree	3
Agree	2
Disagree	1

RESULTS AND DISCUSSION

The study entitled “Indian Classrooms: How suitable for students” yielded the following results which have been presented under following subheadings:

Architectural Features and Fixtures Influencing the Indoor Comfort of Selected Classrooms

Various architectural features and fixtures influencing the indoor comfort of the surveyed classrooms were studied which included doors, windows, ventilators, fans and fluorescent tubes. In the present study, their number and placement was studied. The results obtained are tabulated in Table 1 and can be described as under:

Doors: The flow of students should be the major factor in determining the location of the doors. The design of doors should take into account class student traffic. The doors should open out to the corridor but must be located so that they do not block corridor traffic. Table 1 shows that 90 per cent of the surveyed classrooms had 1 to 2 doors and only 10 per cent had the doors placed in appropriate direction.

Windows: The two primary purposes of classroom windows are aesthetic and environmental (ventilation, view and light). The presence of windows in a room provides visual contact and sensory stimulation with the world outside. All windows in a classroom should be operable so that they can be opened to provide additional air circulation when needed, particularly where the heating, ventilating and air con-

Table 1: Architectural features and fixtures influencing indoor comfort of selected classrooms (n=20)

Architectural features and fixtures	Doors no. (percentage)	Windows no. (percentage)	Ventilators no. (percentage)	Fans no. (percentage)	Fluorescent tubes no. (percentage)
<i>Number</i>					
0	0 (0)	0 (0)	16 (80)	0 (0)	0 (0)
1-2	18 (90)	6 (30)	1 (5)	1 (5)	4 (20)
3-4	2 (10)	10 (50)	3 (15)	9 (45)	8 (40)
5 and above	0 (0)	4 (20)	0 (0)	10 (50)	8 (40)
<i>Placement</i>					
Left	11 (55)	5 (25)	0 (0)	3 (15)	3 (15)
Right	5 (25)	4 (20)	0 (0)	4 (20)	1 (5)
Front	2 (10)	2 (10)	0 (0)	0 (0)	2 (10)
Back	2 (10)	3 (15)	0 (0)	0 (0)	0 (0)
Centre	0 (0)	0 (0)	0 (0)	6 (30)	8 (40)
Randomly placed	0 (0)	3 (15)	2 (10)	1 (5)	2 (10)
Corners	0 (0)	3 (15)	2 (10)	6 (30)	4 (20)

Figures in parentheses indicate percentages.

ditioning system is not present. Windows should either raise and lower or open outwards (never inwards). Windowless classrooms may be desirable in special circumstances. Double or even triple glazed windows will assist in reducing heat transfer and will provide a noise insulation barrier from exterior sounds. When windows are a desirable feature in the classroom design, the glass surface should be limited to minimum amounts. Table 1 shows that half of the classrooms had 3 to 4 windows. Eighty per cent of the classrooms had windows placed at the appropriate location.

Ventilators: The ventilators should not be located in or near loading docks, trash receptacles or areas of high vehicular traffic outside the building. It was noted in the survey that number of ventilators was not sufficient in the classrooms and their placement of the ventilators in the surveyed classrooms was not appropriate.

Fans: The circulation of air is a critical factor in all instructional spaces. Poor air circulation causes students to feel drowsy and not alert. Careful selection of fan units can achieve effective air flow and quiet operation. Table 1 indicates that majority of the classrooms (50 per cent) have more than five fans but all the classrooms had the provision of fans inside

Fluorescent Tubes: Table 1 also shows that majority of the classrooms had more than 3 fluorescent tubes. The lighting should be even over the entire seating area with no pooling or hot spots and light should not shine on the blackboard or projection screens. Illumination of the walls should be minimized to reduce reflections. The lighting levels were sufficient in the classrooms but the placement of lighting was not appropriate and it was not evenly distributed according to the work zones inside the classrooms, that is, between the instructor and blackboard area and the seating area.

Elements of the Interior Enrichment Influencing Classroom Environment of the Selected Classrooms

Various elements of the interior enrichment which influence the classroom environment include walls, ceiling, flooring and curtains. All these make an impact on the classroom environment. These components if properly designed enhance the comfort level inside the classrooms. Appropriate colour and texture of the walls, ceil-

ing and flooring contribute to good visibility and proper acoustics inside the classroom. Bright harsh colours should be avoided as these distract learner and put undue strain on the eyes. Ergonomic principles could re-design the colour and surroundings based on contrast principle (Corlette et al. 1983).

Walls: Majority of classrooms (60 %) in the present study had white coloured walls and majority (90 %) of the walls were having matt finish (Table 2). Classroom walls should have acoustically absorbent finishes like gypsum board, masonry or wood panelling. These surfaces can be painted or vinyl surfaced but should not employ fabric covering or any other acoustically absorbent finish on the rear wall. This reveals that the wall finish was not appropriate in the surveyed classrooms.

Ceiling: Majority of the classrooms had white coloured ceiling. The colour of the ceiling should be light and non reflective if direct lighting is used whereas for indirect lighting, a higher reflective material is required. Because the lighting used in the classrooms was direct lighting system, this can be concluded that the ceiling material was appropriate. Besides majority (75 %) of the classrooms had matt finish on the ceiling.

Flooring: The floor in the general classroom should be vinyl or rubber tile and should have smooth surface. The floor covering should be a medium to light colour and should contain some kind of subdued pattern or fleck to break the monotony and to make it less likely to show dirt and stains. Majority of the classrooms had cemented grey flooring while 90 per cent of them had rough textured flooring which shows that flooring in the surveyed classrooms was not exactly according to the standards but it was fairly good (Table 2).

Curtains: Table 2 reveals that 80 per cent of the classrooms had no curtains. Only 4 (20 per cent) classrooms had curtains out of which two classrooms had light brown coloured curtains, one classroom had dark brown curtains and one classroom had white and blue coloured curtains. Out of these four classrooms, three classrooms had matt textured curtains and one classroom had rough textured curtains.

Subjective Responses Regarding Suitability of Classroom Furniture

The subjective responses while using classroom furniture were taken in order to know the

Table 2: Elements of interior enrichment inside the classrooms (n=20)

	<i>Colour</i>	<i>Number</i>	<i>Shiny</i>	<i>Matt</i>	<i>Rough</i>
<i>Walls</i>	White	12 (60)			
	Cream	3 (15)	0 (0)	18 (90)	2 (10)
	Yellow	4 (20)			
	Light peach	1 (5)			
<i>Ceiling</i>	White	17 (85)			
	Grey	2 (10)	0 (0)	15 (75)	5 (25)
	Cream + White	1 (5)			
<i>Flooring</i>	Grey (cemented)	11 (55)			
	Grey (mosaic)	9 (45)	1 (5)	1 (5)	18 (90)
<i>Curtains</i>	Light brown	2 (10)			
	Dark brown	1 (5)	0 (0)	3 (15)	1 (5)
	White and blue	1 (5)			
	No curtains	16 (80)			

Figures in parentheses indicate percentages.

suitability of furniture to the female students. The data regarding subjective responses have been presented in Table 3 and illustrated in Figure 1. The data reveals that 15.63 per cent respondents strongly agreed to the statement “suitable for work”, while 15.31 per cent agreed and rest of the 69.06 per cent respondents disagreed with this statement. The mean score for this statement was 1.47. This indicates that the existing furniture was not very much suitable for work as perceived by the respondents. Deryck and Patron (2009) also reported that students found their desks not suitable (access and egress) and comfortable and often put strain on their wrists and backs. As far as suitability for body build is concerned, 35.31 per cent respondents out of the total sample strongly agreed while 21.56 per cent respondents agreed and 43.13 per cent respondents disagreed. The mean score for this statement was 1.92. This indicates that the classroom furniture was not very suit-

able according to the anthropometric measurements of the students. The low score indicated that the furniture was not compatible with the anthropometric measurements of the students.

Again, out of the total sample, 18.75 per cent respondents strongly agreed on the statement “suitable for body dimensions” while 37.81 per cent respondents agreed and 43.44 per cent respondents disagreed. The mean score for this statement was 1.75 which was too low. This indicates that the furniture was not compatible with the anthropometric measurements of the students. Dhara et al. (2009) also noted that in more than 30 per cent cases, there was a mismatch in physical dimensions of the furniture and anthropometric measurements of the students. Table 3 further indicates that 16.56 per cent respondents strongly agreed with the statement “suitable for quality work” while 37.19 per cent respondents agreed and the rest 46.25 per cent respondents disagreed. The mean score for

Table 3: Subjective responses regarding suitability of classroom furniture (n=320)*

<i>Suitability of classroom furniture</i>	<i>Strongly agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Mean score</i>
Suitable for work	50 (15.63)	49 (15.31)	221 (69.06)	1.47
Suitable for body build	113 (35.31)	69 (21.56)	138 (43.13)	1.92
Suitable for body dimensions	60 (18.75)	121 (37.81)	139 (43.44)	1.75
Suitable for quality work	53 (16.56)	119 (37.19)	148 (46.25)	1.70
Suitable to move around	87 (27.19)	81 (25.31)	152 (47.50)	1.80
Suitable to get on and off	120 (37.50)	60 (18.75)	140 (43.75)	1.94
Suitable for maintaining correct posture	105 (32.81)	72 (22.50)	143 (44.69)	1.88
Good output	58 (18.13)	80 (25.00)	182 (56.87)	1.61
Overall comfort	62 (19.38)	89 (27.81)	169 (52.81)	1.66
Overall suitability	51 (15.94)	84 (26.25)	185 (57.81)	1.58

Figures in parentheses indicate percentages

*Multiple responses

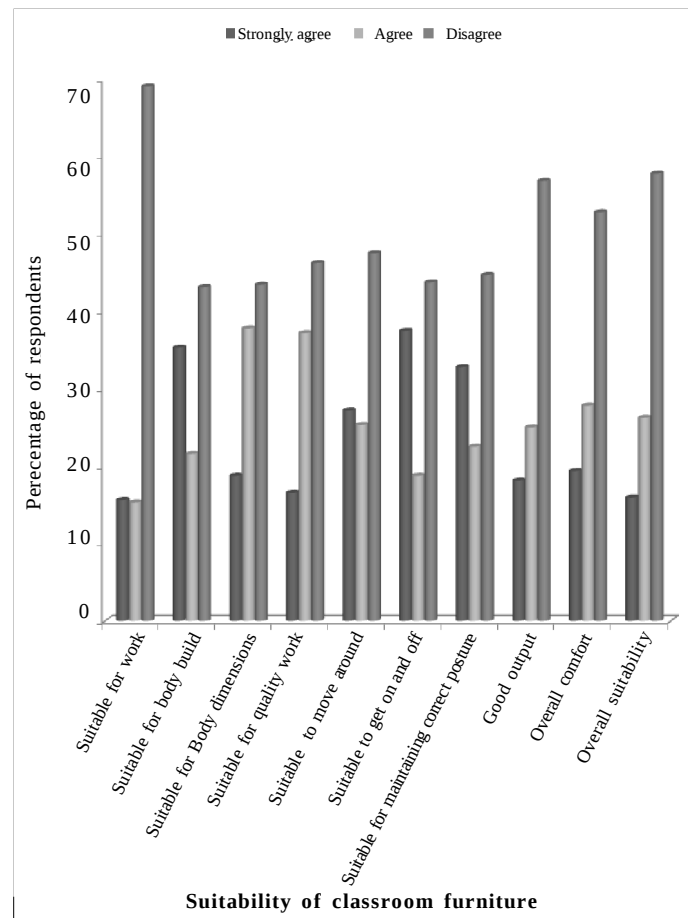


Fig. 1. Subjective responses regarding suitability of classroom furniture

this statement was 1.70. This shows that the furniture was affecting the quality of work of the students. This might be due to the badly designed furniture. Sitting on such type of furniture for longer duration provokes psychological stress and imposes ill effects on human performance.

It is again evident from the Figure 1 that 27.19 per cent respondents strongly agreed with the statement "suitable to move around" while 25.31 per cent respondents agreed and 47.50 per cent respondents disagreed. The mean score for this statement was 1.80. This clearly indicates that the classroom furniture was not suitable in the way that there was not enough space to move around the furniture. This might be due its sharp edges as it was not rounded off from outer edges. There was also less space available between

the different rows of furniture and the overall layout of furniture inside the classrooms was faulty. It can be further noted from the Table 3 that 37.50 per cent respondents strongly agreed with the statement "suitable to move around" while 18.75 per cent respondents agreed and 43.75 per cent respondents disagreed. The mean score for this statement was 1.94. The mean score reveals that there was operational uneasiness while working on the furniture. This might lead to musculoskeletal disorders and sometimes physiological problems among the students. Using furniture that promotes proper posture is more important to younger population than to the older one because it is at this age that the postural problems develop which might lead to serious consequences in the future. Table 3 further reveals that 32.81 per cent respondents

strongly agreed that the furniture was suitable for maintaining correct posture while 22.50 per cent respondents agreed and 44.69 per cent respondents disagreed. The weighted score for this agreement was 1.88 which indicates that the furniture was not very suitable to enable the students to sit in correct posture. Ill designed furniture made them to acquire unnatural and faulty posture for longer period of time, thus resulting in adverse effect on their spinal column.

In order to have a good output, the seating should be comfortable so that an individual does not realize the postural strain and can concentrate fully on the work. The data reveals that 18.13 per cent respondents strongly agreed that the furniture was suitable for good output while one fourth of the respondents agreed to this fact and the rest 56.87 per cent respondents disagreed. The weighted score for this statement was 1.61. This low score indicates that the classroom furniture was not promoting a good output by the students or it was not conducive to good learning. According to Westgaard and Aaras (2009), the proper design of the classroom furniture should be considered, if teaching and learning are to be meaningful and significant.

The overall comfort level of the furniture was low as indicated by the score of 1.66. Out of the total sample, 19.38 per cent respondents strongly agreed that the furniture was not comfortable on the whole while 27.81 per cent of them agreed and 52.81 per cent of the respondents disagreed. A study conducted by Daneshmandi et al. (2008) also revealed similar results where 49.30 per cent of the students were uncomfortable on their desks and none of the desks conformed to their suitability thereby causing fatigue in arms and neck.

The data regarding the overall suitability of the classroom furniture reveals that 15.94 per cent respondents strongly agreed to the overall suitability of the furniture while 26.25 per cent agreed and the rest 57.81 per cent disagreed. The weighted score for this statement was 1.58. This means that the overall suitability of the furniture was nearly 50 per cent which shows that it was not suitable for half of the students and needs proper consideration for making it com-

patible according to the requirement of the students.

CONCLUSION

Indian college students spend a large part of their day sitting in a classroom environment comprising daily routine of tuition classes. Thus, classroom environment has an impact on the students' performance. In the present study, it can be observed that the classroom environment was fairly good as far as architectural features and interior enrichment is concerned. But the responses of students regarding suitability of furniture revealed that it was not suited to all the students and their needs. It was not properly designed thereby creating undue stress, mental fatigue and lack of motivation for learning, at the same time not facilitating ease of use. The students believed that the classroom furniture was not ergonomic and user friendly, thus its continuous use for long duration may affect health, well being and academic performance of the students. There is a need for urgent development and maintenance of better ergonomically designed classroom furniture that would provide a rich learning environment for the students.

RECOMMENDATIONS

The design of classroom involves a multidimensional problem whereby further studies are required in order to understand the key elements and their effect. A similar study can be conducted in rural areas.

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