CHAPTER-IV
FINDINGS AND DISCUSSION

The findings of the Municipal Primary School Teachers of Selected two cities are presented in this chapter. The findings are presented in the form of frequency, percentage and summary tables which were followed by statistical application for testing the hypothesis. The findings are summarized as per the objectives of the research under various parts.

The findings were divided into following sub-sections:

Section 1A: Profile of the Respondents

Section 1B: Assessment of Existing Work Environment of the Municipal Primary School Classroom

Section 2: Perceived Comfort Level of the Respondents Regarding the Existing Facility in the Classroom

Section3A: Postural Analysis of the Municipal Primary School Teachers

Section 3B: Anthropometric Data of the Respondents

Section 4: Psychosocial Factors induced Musculoskeletal Pain among the Municipal Primary School Teachers

Section 5: Musculoskeletal Pain experienced by the Municipal Primary School Teachers

Section 6: Testing of Hypotheses

Section 7: Ergonomic Intervention Programme

Section 4.1A: Profile of the Respondents

This section deals with information regarding background information of the respondents of two cities of Gujarat State. The Profile of the respondents consisting with the information about their locale, age, gender, marital status, family type, family size, personal monthly income, family monthly income and years of teaching experience were collected in this section.

The section also consists of the information regarding mode of conveyance from home to school and distance travelled by the respondents, the standard and subjects taught by them, and the numbers of recess (breaks) taken per day. The section also covered data regarding the hours of use of computer use, hours spent in accomplishing household work and hours spent in maintaining good health per day.

4.1A.1. Profile of the Respondents

Locale: Table 5 shows that the most of the respondents (67.20%) were residing in Vadodara city and 32.80percentof them were staying in Anand city. It was also observed that the respondents generally choose to live in same city in which they sought employment.

Gender: The Gender wise data reflected that a higher percentage of the respondents(78.76%)were found to be females as compared to males (21.24%).The occupation of a primary teacher is more preferred by females than male gender as observed by the researcher.

Age (in years): Table 1 highlights that higher percentage of the respondents (37.36%) were found to be in the age group 41-50 years followed by 51-60 years of age(29.84%). However the younger teachers belonged to the age group between 21 to 40 years i.e. 21-30 years (5.1%) and 31-40 years (27.7%). The mean age of the respondents was 44.5 years.

Marital Status: The data regarding the marital status of the respondents showed that majority of the respondents were married (90.30%). However, very few of them were single (5.40%) and Widow/Separated/Divorced (4.30%).

Table 5: Profile of the Respondents
(n=372)

Sr. No.	Profile of the Respondents	f	%
i.	**Locale**		
	Vadodara	250	67.20
	Anand	122	32.80
ii.	**Gender**		
	Female	293	78.76
	Male	79	21.24
iii.	**Age (in Years)**		
	21-30	19	5.10
	31-40	103	27.70
	41-50	139	37.36
	51-60	111	29.84
	Mean Age	44.52	
	Standard Deviation	8.40	
iv.	**Marital Status**		
	Married	336	90.30
	Single	20	5.40
	Widow/ Separated/Divorced	16	4.30
v.	**Type of Family**		
	Nuclear	194	52.20
	Joint	178	47.80
vi.	**Size of Family**		
	Small (1-4 members)	235	63.20
	Medium (5-7 members)	118	31.70
	Large (>=8 members)	19	5.10

Type of Family: The table5 revealed that more than one-half of the respondents (52.2%) were living in nuclear family whereas, a little less than one-half (47.8%) were living in joint family.

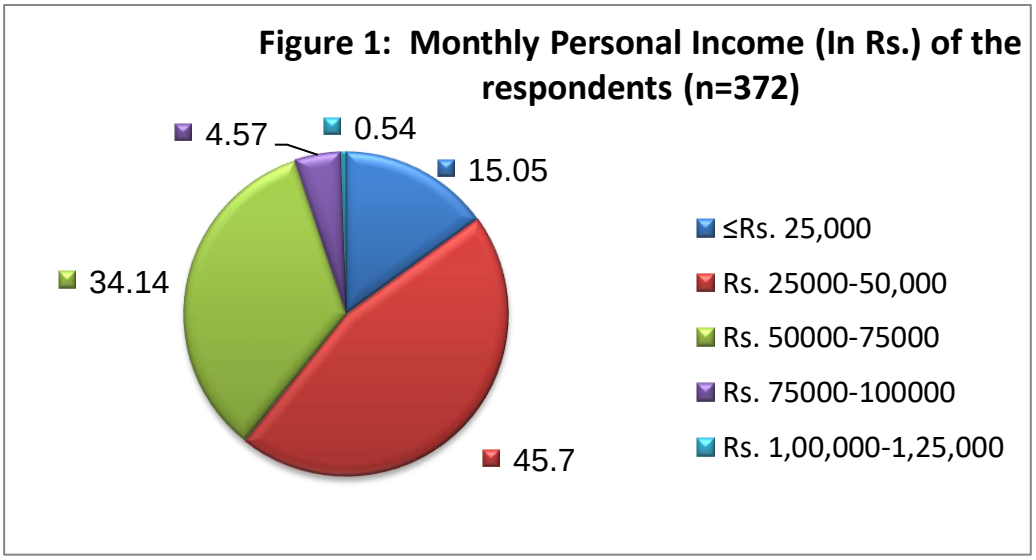
Size of Family: The data shows that most of the respondents (63.20%) had small sized family having four or less family members. However, a little less than one-third (31.70%) of them had medium sized family with five to seven family members. In medium sized families, the children and grand parents were living together. Very few of them(5.10%) were having large sized family.

4.1A.2. Monthly Personal Income of the respondents (in Rs.)

A probe on the monthly personal income of the respondents depicted that higher percentages of them (45.70%) were earning between Rs. 25,000-50,000 per month. The findings further reported that 34.14% of them were earning in the range between Rs. 50,000-75,000 per month. The data also revealed that 15.05percent of the respondents were earning ≤Rs. 25000 per month whereas, very few of them(4.57%) and (0.54%) indicated higher monthly personal income in the range of Rs. 75000-1,00,000 and Rs.1,00,000-1,25,000 respectively.

Table 6: Monthly Personal Income (In Rs.) of the respondents (n=372)

Sr. No.	Personal Monthly Income (in Rs.)	f	%
1	≤Rs. 25,000	56	15.05
2	Rs. 25000-50,000	170	45.70
3	Rs. 50000-75000	127	34.14
4	Rs. 75000-100000	17	4.57
5	Rs. 1,00,000-1,25,000	2	0.54
	Total	**372**	**100**



The teachers (15.05%) who were appointed on the contractual basis were found to be earning ≤Rs. 25000 per month. The contractappointments were of the duration of five years after which the teachers get permanent appointment.

4.1A.3. Monthly Family Income (in Rs.) of the respondents

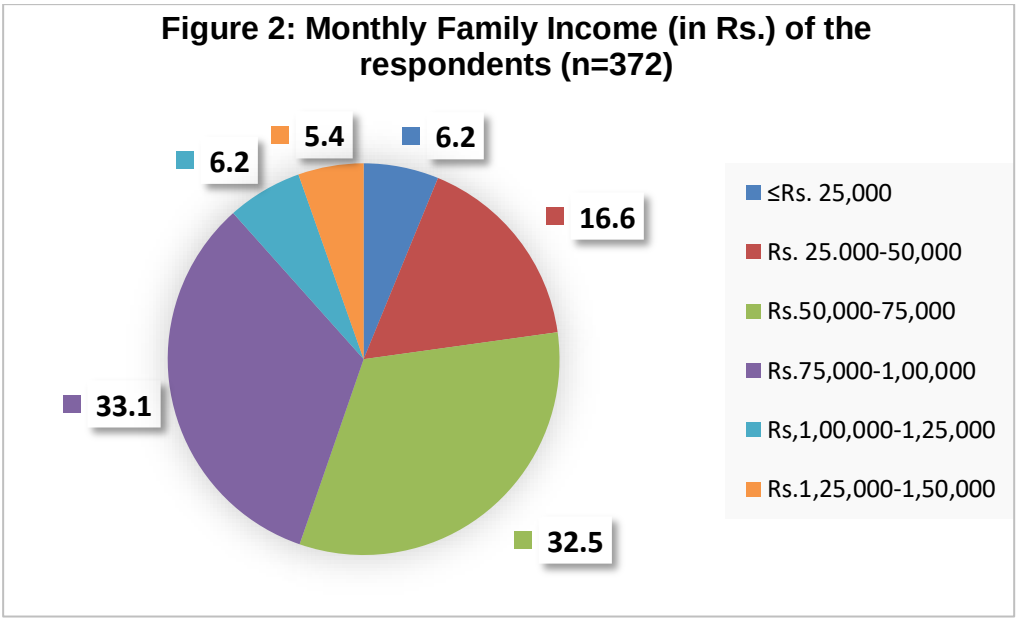
An enquiry for additional information was conducted by the researcher to know the Family Monthly Income (in Rs.)of the teacher's family. The data (Table 7) revealed the family monthly income of few respondents ranged from Rs. 1,00,000 to Rs.1,50,000.It was also noticed that the respondents possessing joint family with more working members were having higher monthly family income as compared to the ones possessing nuclear families.

Table 7: Monthly Family Income (in Rs.) of the respondents

(n=372)

Sr. No.	Family Monthly Income (in Rs.)	f	%
1	≤Rs. 25,000	23	6.20
2	Rs. 25.000-50,000	62	16.60
3	Rs.50,000-75,000	121	32.50
4	Rs.75,000-1,00,000	123	33.10
5	Rs,1,00,000-1,25,000	23	6.20
6	Rs.1,25,000-1,50,000	20	5.40
	Total	**372**	**100**

Figure 2: Monthly Family Income (in Rs.) of the respondents (n=372)



A 33.10percent of the respondents were having their monthly family income ranging from Rs. 75,000 to Rs.1,00,000. The finding further reported that 32.50percent of the respondents were having their

monthly family income ranged between Rs. 50,000 to Rs. 75,000. The monthly family income of very few respondents was found to be ≤Rs. 25000. The data revealed that the lowest Family Monthly Income (in Rs.) of the respondents was less than or equal to Rs. 25000 per month and the highest was Rs.1,50,000 per month.

4.1A.4. Years of Experience in Teaching Profession

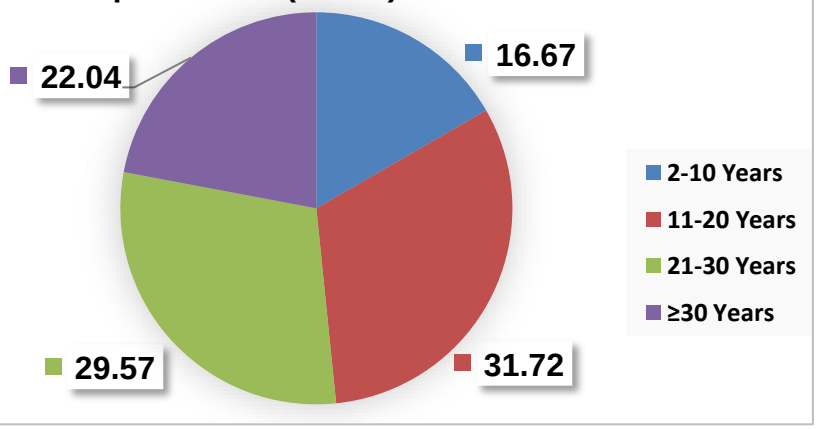
According to Bridger (1997), "Work experience is the experience that a person has during working a job, or working in a specific field or occupation." The data reflected in table 8 and figure 3 on teaching experience of the respondent highlighted that 31.72 percent of the respondents were having their teaching experience ranging between 11 to 20 yrs, whereas 22.04percent of the respondents were having their teaching experience ≥30 years.

Table 8: Years of Experience in teaching profession by the respondents

(n=372)

Sr. No.	Years of Experience	f	%
1	2-10 Years	62	16.67
2	11-20 Years	118	31.72
3	21-30 Years	110	29.57
4	≥30 Years	82	22.04
	Total	**372**	**100**

Figure 3: Years of Experience in teaching profession (n=372)



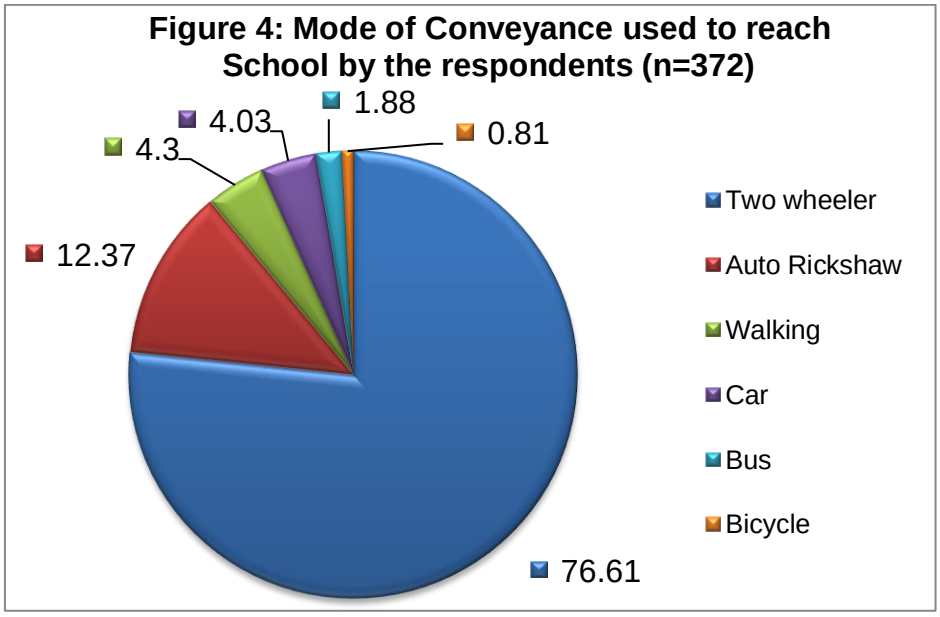
4.1A.5.Mode of Conveyance used by the respondents to Reach School

An enquiry for additional information was conducted by the researcher to know the mode of conveyance used by the respondents to reach the school. The data reflected in table 9and Figure 4 indicates the mode of conveyance used by the respondents to reach their respective schools. Majority of the respondents (76.61%) were using two wheeler vehicles to reach their workplace, followed by auto rickshaw (12.37%).

Table 9: Mode of Conveyance used to reach School by the respondents

(n=372)

Sr. No.	Mode of Conveyance used to reach School by the respondents	f	%
1	Two wheeler	285	76.61
2	Auto Rickshaw	46	12.37
3	Walking	16	4.30
4	Car	15	4.03
5	Bus	7	1.88
6	Bicycle	3	0.81
	Total	**372**	**100**



However the data also revealed that very few of them (4.30%) were reaching their respective schools by walking, own driven car (4.03%), bus (1.88%) and by bicycle (0.81%). It was also found that for maintaining good health, bicycle was used by the respondents (Table 9).

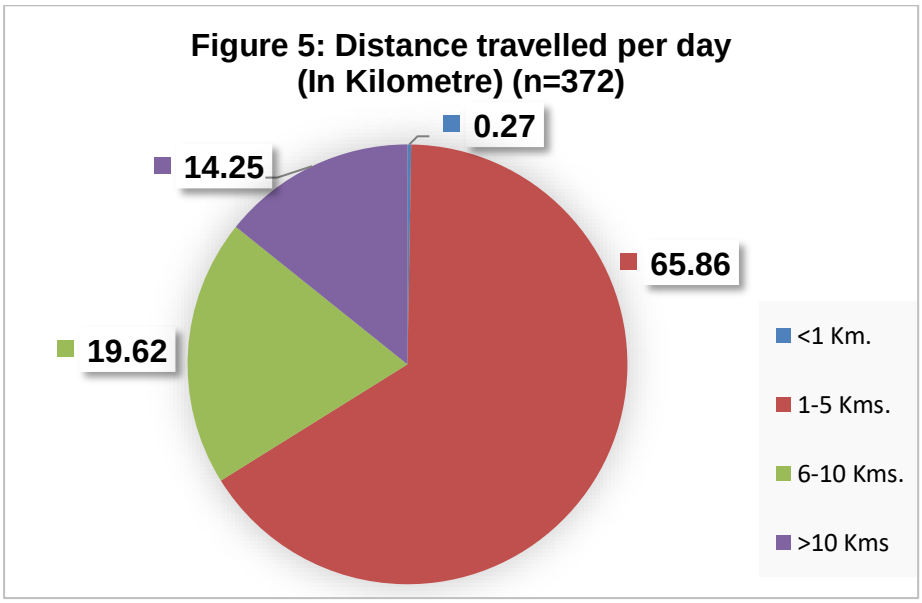
4.1A.6. Distance travelled by the respondents between Home and School

Table 10 indicates the distance covered by the respondents per day to reach to their respective schools from their home. It was found that most of respondents (65.86%) were travelling from 1-5 Kms to reach their workplace from home every day.

Table 10: Distance travelled between Home and School by the respondents

(n=372)

Sr. No.	Distance travelled per day (In Kilometre)	f	%
1	<1 Km.	1	0.27
2	1-5 Kms.	245	65.86
3	6-10 Kms.	73	19.62
4	>10 Kms	53	14.25
	Total	**372**	**100**



However, nearly one-fifth of them (19.62%) were travelling 6-10 Kms of distance to reach their school from their home. Few of them (14.25%) were travelling the distance of more than 10 Kms from their home to school. The maximum distance covered by one of the respondent was 75 Kms and minimum distance covered by one of the respondent was 0.5 Km every day. The respondents who were not residing in same city of work were commuting everyday moving from home to school by road through car, bus and auto rickshaw like public transports.

4.1A.7.Subjects Taught in Municipal Primary School

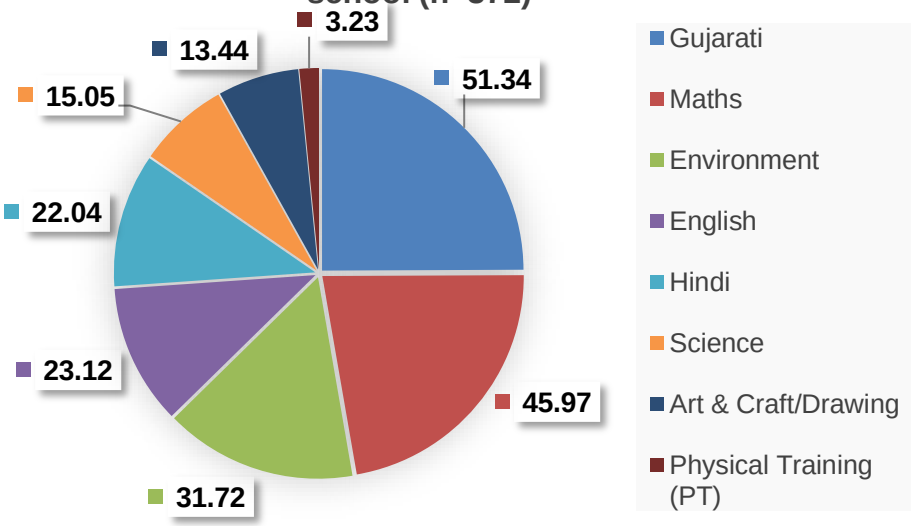
A probe was also made to find out the subjects the respondents taught in municipal primary school. The data in table 11 and figure 6 highlights that the respondents were teaching multiple subjects at their school. In standard 1 and standard 2 single respondents were found teaching all the subjects. Thus it was restricting movement of the teacher to their respective classes throughout the day. The findings showed that more number of the respondents were involved in teaching subjects like Gujarati (51.34%) and Maths (45.97%).

Table 11:Subjects the respondents teach in their school
(n=372)

Sr. No.	Subject	f	%
1	Gujarati	191	51.34
2	Maths	171	45.97
3	Environment	118	31.72
4	English	86	23.12
5	Hindi	82	22.04
6	Science	56	15.05
7	Art & Craft/Drawing	50	13.44
8	Physical Training (PT)	12	3.23

Note: Multiple Responses.

Figure 6: Subjects the respondents teach in their school (n=372)



However, the respondents were also found teaching the subjects like Environment/ Social Studies (31.72%), English (23.12%) and Hindi (22.04%). Very few of them (15.05%, 13.44% and 3.23%)were teaching Science, Arts and Crafts/Drawing and Physical Training. The researcher noticed during data collection that there was shortage of teachers teaching subjects like Science, Art & Craft/Drawing and Physical Training (PT).

4.1A.8. Standard (Class) taught by the respondents in their School

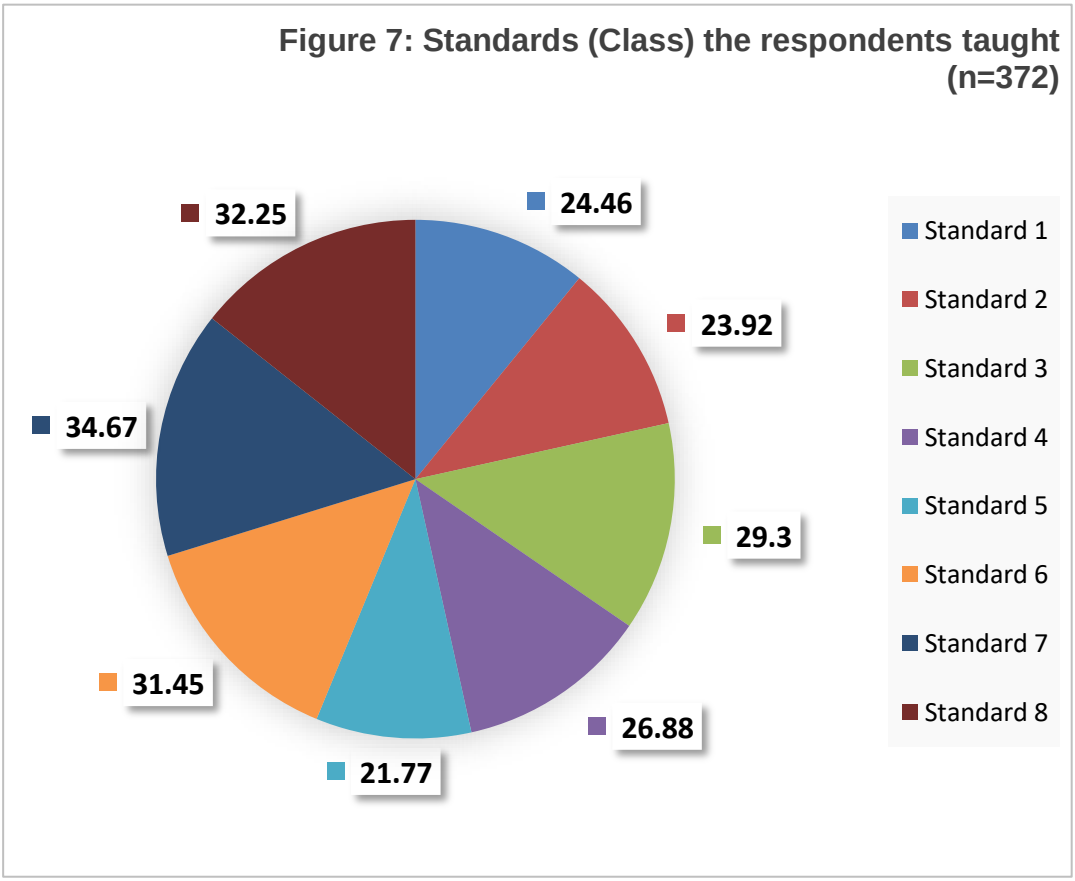
Table 12 indicates the distribution of respondents according to the standard (Class) taught by them in their schools. It shows that comparatively higher percentages of the respondents were teaching students of Standard-7 (34.67%),Standard-8 (32.25%), and Standard-6 (31.45%).However, the respondents were also found teaching students of Standard-3 (29.30%), Standard-4 (26.88%), Standard-5 (21.77%) and Standard 3, 4, 5 of the primary sections of the schools. This highlights that the higher percentages of the respondents were involved in teaching upper primary section (Standard 6, 7, 8) of the schools.

Table 12: Standards(Class) the respondents taught by them in Municipal Primary Schools

(n=372)

Sr. No.	Standard (Class)Taught	f	%
1	Standard 1	91	24.46
2	Standard 2	89	23.92
3	Standard 3	109	29.30
4	Standard 4	100	26.88
5	Standard 5	81	21.77
6	Standard 6	117	31.45
7	Standard 7	129	34.67
8	Standard 8	120	32.25

Note: Total exceeds due to multiple responses.



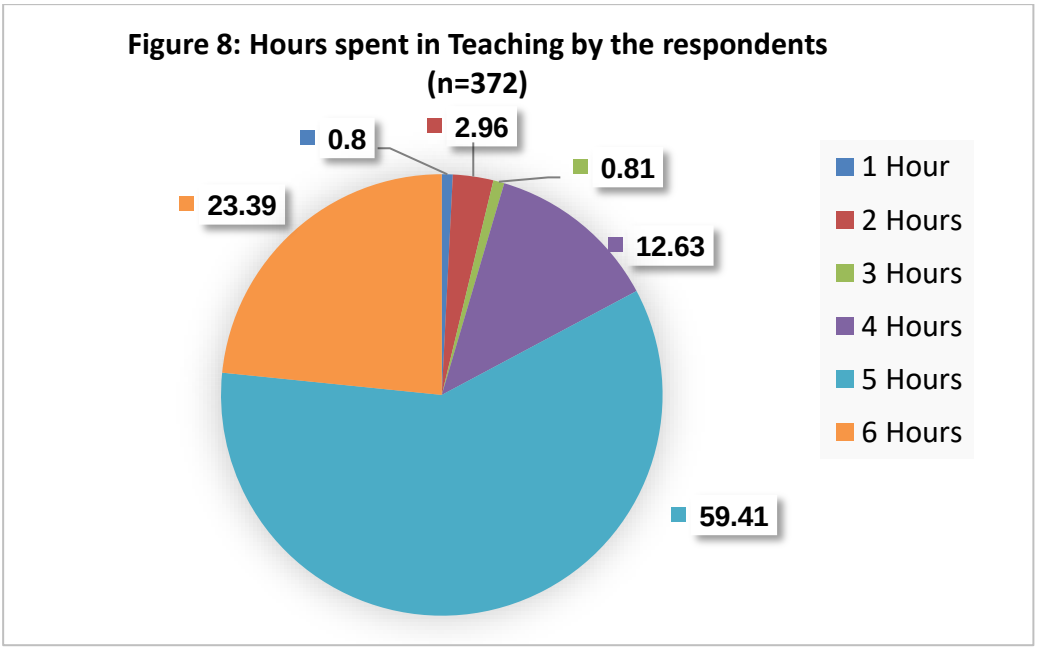
4.1A.9. Hours Spent in Teaching by the respondents in Municipal Primary Schools

A probe was also made to find out the working hours of the respondents while teaching in municipal primary school. The data (Table 13 and Figure 8) regarding the work hours of the respondents in teaching showed that the most of the respondents (59.41%) were spending at least 5 hours daily in teaching at their respective municipal primary school.

Table 13:Hours spent in Teaching by the respondents at their Municipal Primary Schools

(n=372)

Sr. No.	Hours Spent while teaching in Municipal Primary School	f	%
1	1 Hour	3	0.80
2	2 Hours	11	2.96
3	3 Hours	3	0.81
4	4 Hours	47	12.63
5	5 Hours	221	59.41
6	6 Hours	87	23.39
	Total	**372**	**100**



However, nearly one-fourth of them were spending 6 hours (23.39%) in teaching in municipal primary school. The findings also revealed that less number of the respondents were found spending 4 hours (12.63%), 2 hours (2.96%), 1 hour (0.81%) and 3 hours (0.81%). Spending more time in teaching indicates the interest of the teacher in teaching their subjects. The teachers were given extra assignment of teaching in other subjects too because of lack of teachers in the schools.

4.1A.10. Hours spent while teaching in Standing Position

Table 14reflected that 26.60%of the respondents were found spending 2 hours as well as 4 hours (24.20%) in teaching at their schools in standing position. Whereas, almost an equal percentages of the respondents were teaching in standing position for 3 hours (16.40%) and for 5 hours (16.93%). Few of them were spending only 1 hour (12.63%) in teaching in similar position. The findings also reported that 12 respondents were not found teaching in standing position, as they must be facing difficulties in teaching in standing position for longer time.

Table 14: Hours spend while teaching in standing position in their school by the respondents

(n=372)

Sr. No.	Hours Spent while teaching in Standing Position	f	%
1	1 Hour	47	12.63
2	2 Hours	99	26.61
3	3 Hours	61	16.40
4	4 Hours	90	24.20
5	5 Hours	63	16.93
6	No teaching in standing position	12	3.23
	Total	**372**	**100**

It can be assumed that those who are spending more hours on teaching in standing position could be the ones who perceived

extremely good and good health (refer table 21). Perceived health as supportive factor that may have been assisted the respondents to stand for longer duration while teaching.

4.1A.11. Hours spent in Teaching in Sitting Position

The data (Table 15) regarding the hours spent by the respondents in teaching at their school in sitting position indicated that more number of the respondents were spending 1 hour (30.39%) to 2 hours (29.57%) teaching in municipal primary school. Table 15 highlighted that very few of them were spending 3 hours (10.22%), 4 hours (5.91%) and 5 hours (4.30%) on teaching in sitting position respectively. The data indicates that the majority of them preferred to teach in standing position. The finding also reported that 73 respondents did not adopt sitting position while teaching.

Table 15: Hours spend while teaching in sitting position in their school by the respondents

(n=372)

Sr. No.	Hours Spent while teaching in Sitting Position	f	%
1	1 Hour	113	30.38
2	2 Hours	110	29.57
3	3 Hours	38	10.22
4	4 Hours	22	5.91
5	5 Hours	16	4.30
6	No teaching in sittingposition	73	19.62
	Total	**372**	**100**

4.1A.12. Hours Spent in Teaching in Flexion Position

A probe was also made to find out the hours spent in teaching in flexion position (Bending and Twisting together) by the respondents. Table 16 revealed that the 40.9 percent of the respondents preferred teaching in flexion position at their schools for at least 1 hour. However, very few of them were spending 2 hours (14.80%) and 3 hours (3.50%) for the same. Remaining 40.9 percent of the respondents did not spend time while teaching in flexion position at their schools. Teaching in flexion position may help the respondents in stretching their body for reaching children sitting on the ground. But teaching or instructing students in this position for longer duration can cause pain and discomfort in the respondents.

Table 16: Hours spent by the respondents at their School Teaching in Flexion Position

(n=372)

Sr. No.	Hours Spent while teaching in Flexion Position	f	%
1	1 Hour	152	40.86
2	2 Hours	55	14.78
3	3 Hours	13	3.50
4	No teaching in flexionposition	152	40.86
	Total	**372**	**100**

4.1A.13. Number and Duration of breaks received by the respondents

Table 17 shows that most of the respondents (68.82%) were getting at least one break in the municipal primary school, whereas nearly one-fifth of them (19.35%) were getting 3 breaks during teaching work hours in the municipal primary schools. The data regarding the duration of break time showed that higher percentages of them (28.2%) were getting 15 minutes break during their work hours in the school. However, 26.1% percent were getting 30 minutes and 25.80%were getting 45 minutes daily. The others were getting 20 minutes (9.90%), 40minutes (4.80%), 35 minutes (3.80%) and 25 minutes (1.30%) in the schools.

Table 17: Number and Duration of breaks the respondents receives at their School

(n=372)

i.	**No. of Breaks**	**f**	**%**
	1	256	68.82
	2	44	11.83
	3	72	19.35
	Total	**372**	**100**
ii.	**Duration of Break (in Minutes)**	**f**	**%**
	15 Minutes	105	28.22
	20 Minutes	37	9.95
	25 Minutes	5	1.34
	30 Minutes	97	26.08
	35 Minutes	14	3.76
	40 Minutes	18	4.84
	45 Minutes	96	25.81
	Total	**372**	**100**

The break is a necessary element in each job. It may help the employee to refresh him/herself during work hours. 35 minutes, 40 minutes and 45 minutes of break time were given to schools. The

municipal primary schools were having mid-day meal facility for all the students. It was noticed by the researcher that the afternoon schools had shorter breaks as compared to morning schools coz at the starting of the afternoon school the students were given the mid day meal at 12 noon from Monday to Friday. And on Saturday the students were having morning shift starting from 7:30 am to 11:30 am so the meals were given after the school.

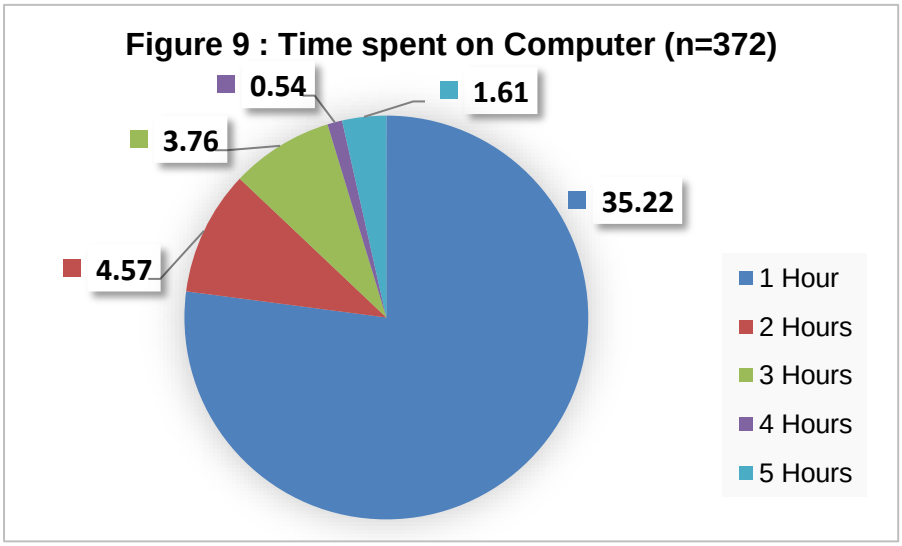
4.1A.14.Time Spent on Computer by the respondents

A probe on the time spent on using computers by the respondents (Table 18 and Figure 9) elicited that higher percentage of the respondents (54.30%) were not using computers. It was also noticed by the researcher that 35.22% of the respondents were spending one hour of computer work. And more than one-half of the respondents were not using computer in the school they were using mobile instead.

Table 18: Time spent on Computer by the respondents

(n=372)

Time Spent	f	%
1 Hour	131	35.22
2 Hours	17	4.57
3 Hours	14	3.76
4 Hours	2	0.54
5 Hours	6	1.61
No computer usage	202	54.30
Total	**372**	**100**



4.1A.15. Time spent on Routine Physical Exercise by respondents

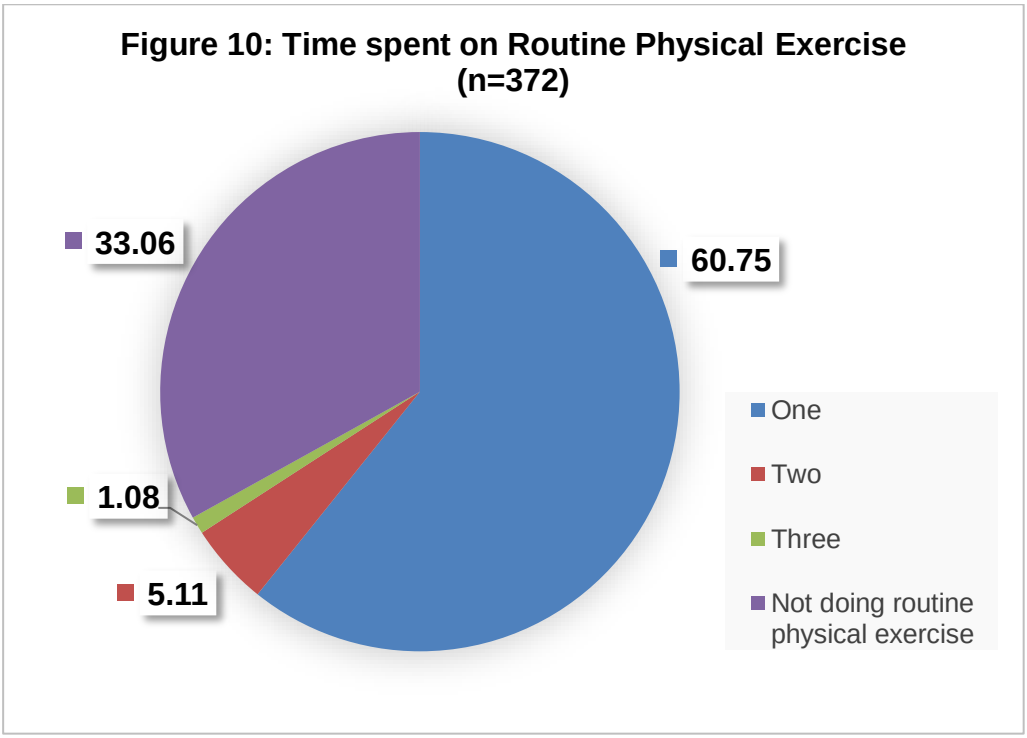
Table 19and figure 10 indicated that most of the respondents (60.75%) were spending one hour daily on routine physical exercises. It was also highlighted that one-third of them (33.06%) were not doing any kind of physical exercises. However, very few of them were found spending 2 hours (5.11%) and 3 hours (1.08%) respectively on the same. It is interesting to know that despite of the tight work schedule, most of them were involved in routine physical exercise reflecting that they were concerned about maintaining their good health.

Table 19: Time spent on Routine Physical Exercise by the respondents

(n=372)

Time Spent in Hours	f	%
One	226	60.75
Two	19	5.11
Three	4	1.08
Not doing routine physical exercise	123	33.06
Total	**372**	**100**

Figure 10: Time spent on Routine Physical Exercise (n=372)



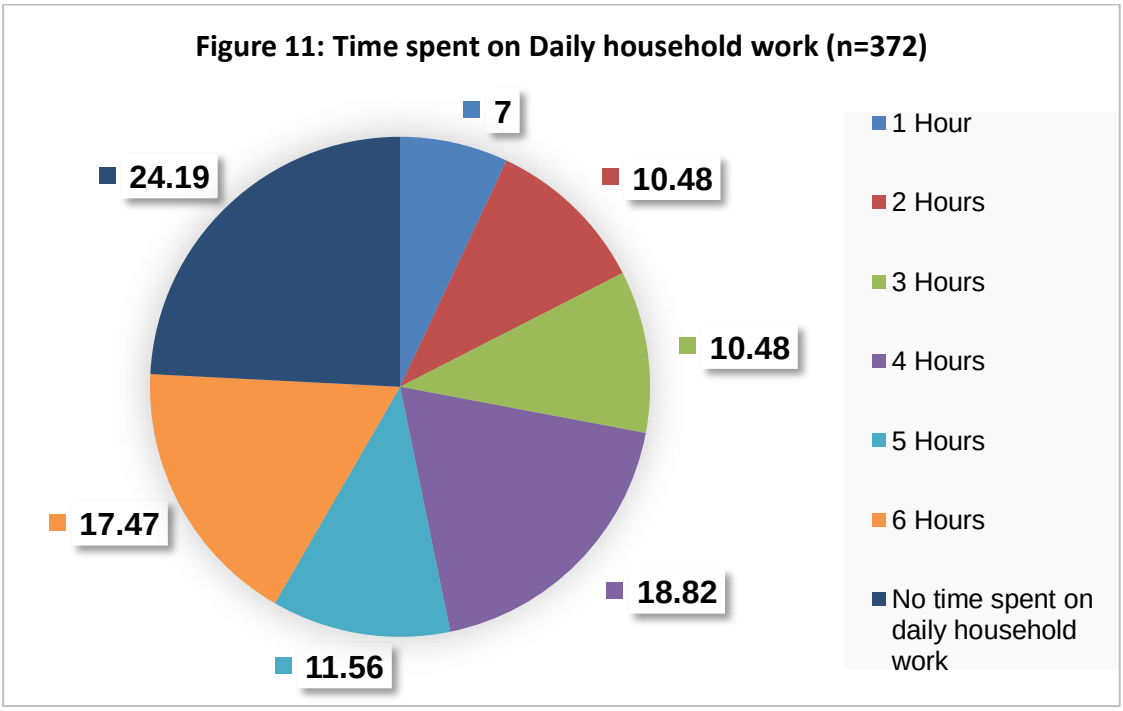
4.1A.16. Time Spent on Daily Household Work by the respondents

The data in table 20 and Figure 11reflected that comparatively a higher percentage of the respondents (24.19%) were not spending time on routine household work. The respondents were hiring maids to do their household work. However, one-tenth of the respondents were found spending 2 hours and 3 hours in doing household work.

Table 20: Time spent on Daily household work by the respondents

(n=372)

Time Spent in hours	f	%
1 Hour	26	7.00
2 Hours	39	10.48
3 Hours	39	10.48
4 Hours	70	18.82
5 Hours	43	11.56
6 Hours	65	17.47
No time spent on daily household work	90	24.19
Total	**372**	**100**



It was interesting to know that despite of the tight work schedule, most of them (table 20 and Figure 11) were involved in routine physical exercise. It definitely helps in maintaining good health.

4.1A.17. Perceived Health Status of the Respondents

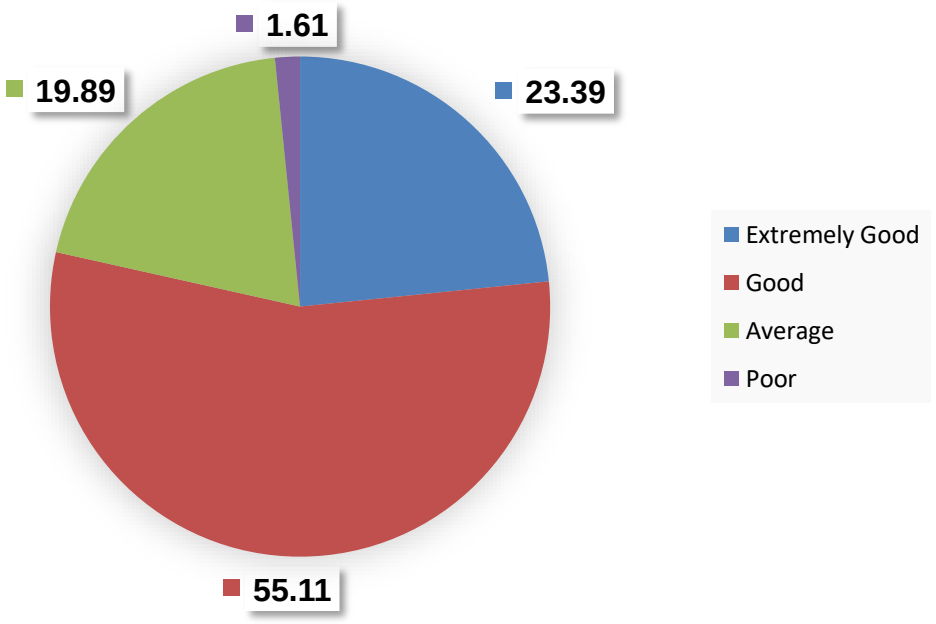
Table 21 and Figure 12 highlighted that a higher percentages of the respondents perceived their health status as good (55.11%)and 23.39% of them as extremely good. The data (Table 20)regarding their involvement on physical exercise also indicates their good health status. However, there were respondents who perceived their health as average (19.89%) and poor (1.61%) too.

Table 21: Perceived health status of the respondents

(n=372)

Sr. No.	Health Status	f	%
1	Extremely Good	87	23.39
2	Good	205	55.11
3	Average	74	19.89
4	Poor	6	1.61
	Total	**372**	**100**

Figure 12: Perceived health status of the respondents (n=372)



Section: 4.1B: Assessment of Existing Work Environment of the Municipal Primary School Classroom

The work environment has a positive impact on the job satisfaction that may leads to better work performance of the employees (Raziq and Maulabakhsh, 2015). Therefore, it becomes important for employers to provide good work environment to attain better productivity. In view of this, the present study aimed to assess the existing work environment of the classrooms of selected Municipal Primary Schools of Gujarat State. It included the assessment of physical factors such as dimensions of the classroom, ventilation, provision of light, temperature, colour schemes as well as the furniture used in the classroom.

4.1B.1. The Classrooms Dimensions of the Municipal Primary Schools

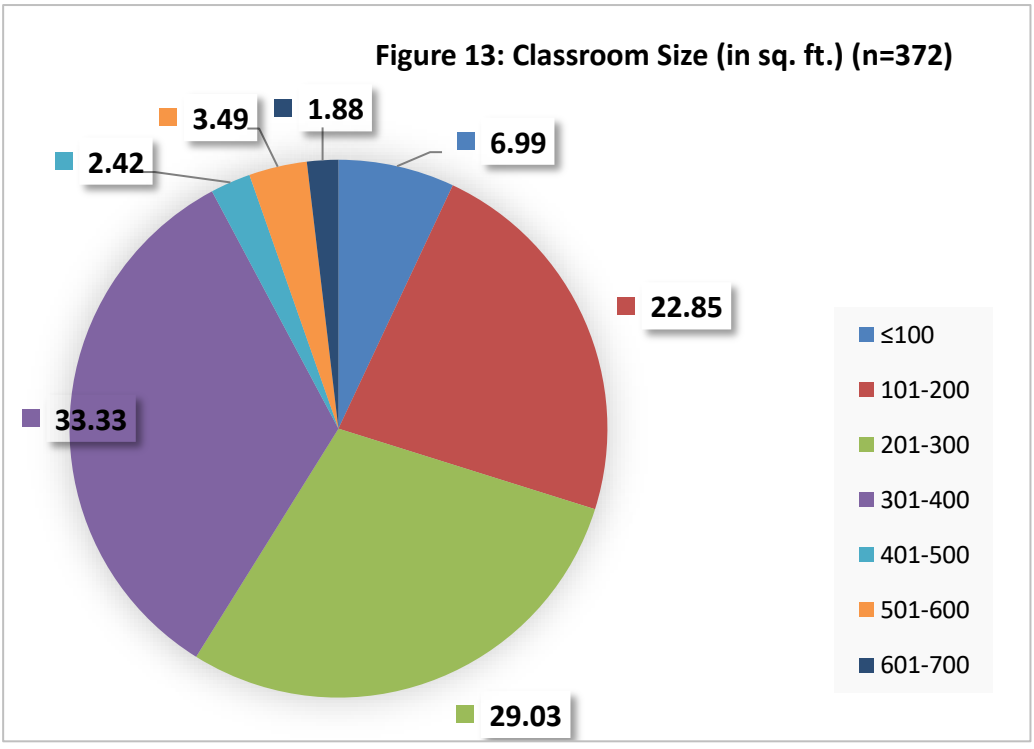
A probe was made to find out the existing classroom dimensions In square foot of municipal primary school. Observations were taken by the researcher for 372 individual classrooms. Table 22and Figure 13 reflected the data regarding size of the existing classrooms of the selected municipal primary schools.

The maximum size of the classroom observed was 700 sq. ft. and minimum was 88 sq. ft. The mean size of the classroom was 311.35 sq. ft. It also came to notice that all the classrooms were having 10’-0” ft. ceiling height. The classrooms were found to be kept neat and tidy for the children.

Table 22: The Classrooms Dimensions of the Municipal Primary Schools

(n=372)

Sr. No.	Classroom Size (in sq. ft.)	f	%
1	≤100	26	6.99
2	101-200	85	22.85
3	201-300	108	29.03
4	301-400	124	33.33
5	401-500	09	2.42
6	501-600	13	3.49
7	601-700	07	1.88
	Total	**372**	**100**
Maximum Size (sq.ft.)700(sq. ft.) Minimum Size (sq.ft.)88(sq. ft.) Mean Size (sq.ft.)311.35 (sq. ft.)			



Ideally the size of the room should depend upon the number of students to accommodate in a class. The standard space of students in a of primary school classrooms in India is reported to be 11.94 sq. ft. per student (ISI, 1978). The Municipal primary school classrooms of

Vadodara and Aanand City were found smaller in size when compared to the standard space per student in a classroom. The researcher noticed that the smallest classroom was 11’-0” x 8’-0” ft. in dimension. As per the standard space it means that it could accommodate only six students in given size of classrooms. It was also observed that the largest classroom was 35’-0” x 20’-0” ft. in size. These big classrooms were used for higher standard classrooms like Standard Six, Standard Seven and Standard Eight according to ISI, 1978 standard space per student in a classroom on an average in India. The Standard One and Two were having less than 30 students in a classroom hence the smaller classrooms were being used for them.

4.1B.2. Colours painted on the walls of the Municipal Primary Schools

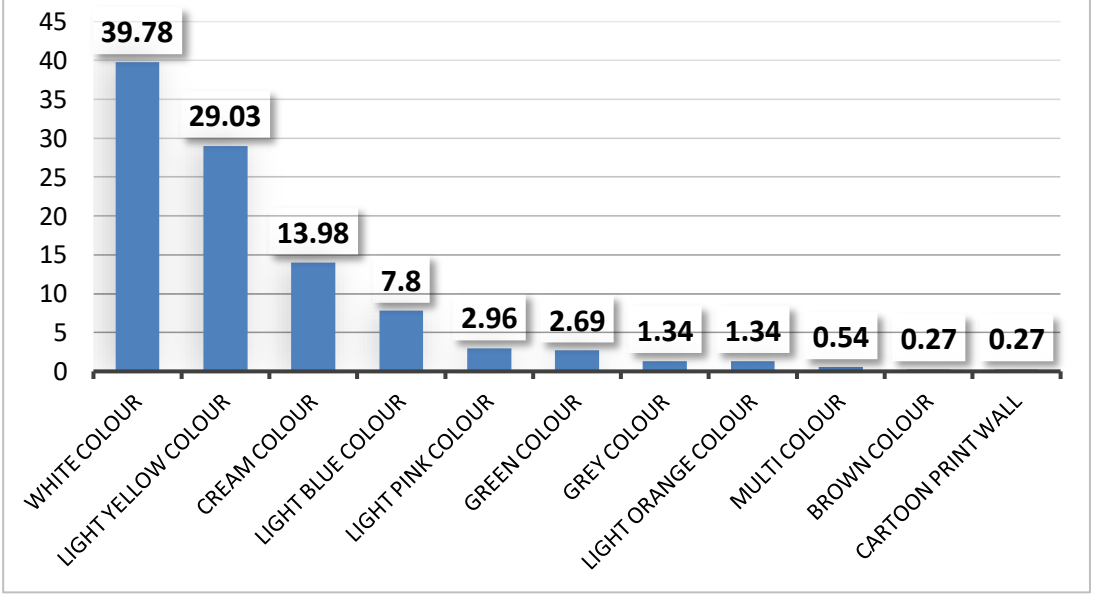
The colour of the classrooms wall was also noted during the observations of Municipal primary school classrooms (Table 23 and Figure 14). It was found that 39.80% per cent of the classrooms were painted with white colour followed by light yellow colour (29.03%) and cream colour (13.98%). Only one classroom had painted cartoons on the walls and was used for standard (class) one children. In some of the classroom dark green, brown and gray colour was also used. The reason for painting the walls with dark colours was to stop students from making walls dirty. The classrooms were painted with dark colour from base of the walls till four feet. These darker colours were making the classroom look dull, dark and gloomy. The colour of the walls is an essential element in classroom designing. The colours affect the mood of the students and the teachers in the classroom and may affect the teaching and learning process. Lighter and brighter colour makes the classroom more cheerful than dark colour classroom.

Table 23: Colour painted on the Walls of the Municipal Primary Schools

(n=372)

Sr. No.	Painted colours on Classroom Walls	f	%
1.	White Colour	148	39.78
2.	Light Yellow Colour	108	29.03
3.	Cream Colour	52	13.98
4.	Light Blue Colour	29	7.80
5.	Light Pink Colour	11	2.96
6.	Green Colour	10	2.69
7.	Grey Colour	05	1.34
8.	Light Orange Colour	05	1.34
9.	Multi Colour	02	0.54
10.	Brown Colour	01	0.27
11.	Cartoon Print Wall	01	0.27
	Total	**372**	**100**

Figure 14: Painted colours on Classroom Walls (n=372)



4.1B.3. Colours Painted on the Ceiling of the Classrooms of the Municipal Primary Schools

A probe was made to find out the colours painted on the ceiling of the classrooms of the Municipal primary schools (Table 24 and Figure 15). It was found that very few of the classrooms were painted with different colours viz. cream (1.60%), gray (1.01%), light yellow (0.50%), and dark brown (0.30%). Majority of the classrooms' ceiling were painted with white colour (91.94%). However, the researcher had also noticed plain gray cement sheet made up of cement material (3.50%) in some of the classrooms. These sheets were having dark gray colour. Application of dark colour on the ceiling creates an illusion of decreased height of it. Dark colour ceiling is not suitable for the classroom. The researcher also observed that some of the classroom ceiling had exposed wire connection fixed on the ceiling for the light and fan connection. Only 1.10percent of the classrooms were having roof made up of metal sheet without any paint done on it. These classrooms were having hut style roof. With no floors above them, having a single story structure which needed renovations. It was also observed that in some parts of metal sheet without any paint started rusting and discoloured.

Table 24: Colour Painted on the Ceiling of the Classrooms of the Municipal Primary School

(n=372)

Sr. No.	Colour Painted on the Ceiling	f	%
I.	White Colour Paint	342	91.94
II.	Plain Gray Cement Sheet	13	3.49
III.	Cream Colour Paint	06	1.61
IV.	GrayColour Paint	04	1.08
V.	Roof made of Metal Sheet (No Colour)	04	1.08
VI.	Light Yellow Colour Paint	02	0.54
VII.	Dark Brown Colour Paint	01	0.27
	Total	**372**	**100**

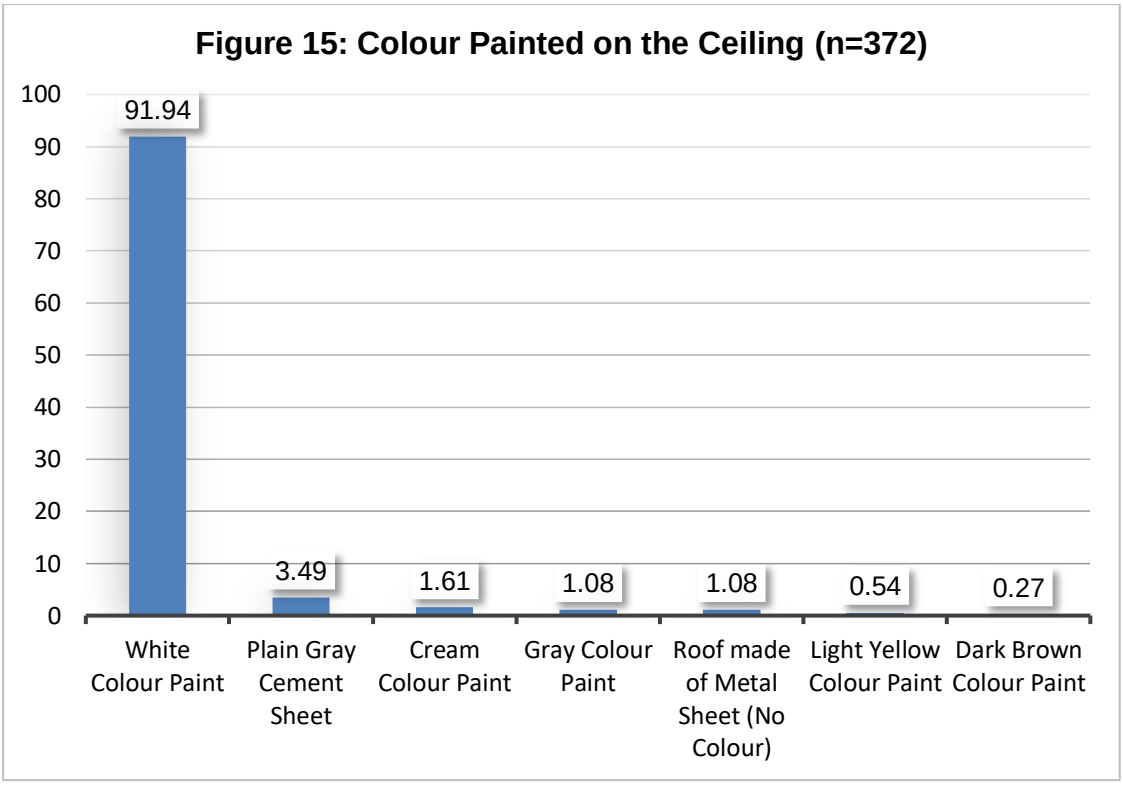


Plate 4: White Colour Painted on the Ceiling in the Class Room

Plate 5: Checked Tiles Flooring in the Class Room

4.1B.4. Types of Flooring in the Classrooms of the Municipal Primary Schools

Table 25 and figure 16 highlighted that the higher percentage of the Municipal Primary School opted Kota stone (42.20%) for classroom flooring whereas Checker tiles were also found to be(35.20%) in the schools. Kota-stone was still the most preferred flooring material in Municipal Primary School classrooms. It is strong, durable, and easy to clean and required less maintenance. Furthermore, it was found that almost one-fifth (20.70%) of the schools had no floor treatment classroom except cement plastering. It was also observed by the researcher that in some areas cracks had developed in the cement plastered flooring. The researcher noticed that very few of classrooms had flooring of vitrified tiles (1.30%) and ceramic tiles (0.30%). The vitrified tiles and ceramic tiles were having off-white and light brown shades. The schools that had undergone new construction or renovation had used vitrified tiles and ceramic tiles as a flooring material. Only a small number (0.30%) of old school were having flooring of wooden planks that required being renovation. The wooden

planks flooring was quite old having cracks on it due to heavy wear and tear.

Table 25: Flooring in the Classrooms of the Municipal Primary School

(n=372)

Sr. No.	Flooring in the class room	f	%
1	Kota-stone	157	42.20
2	Checked Tiles	131	35.22
3	Cement Plaster	77	20.70
4	Vitrified tiles	05	1.34
5	Ceramic Tiles	01	0.27
6	Wooden Planks	01	0.27
	Total	**372**	**100**

Plate 6: Kota-stone Flooring in the Class Room

Figure 16: Flooring in the Classrooms (n=372)

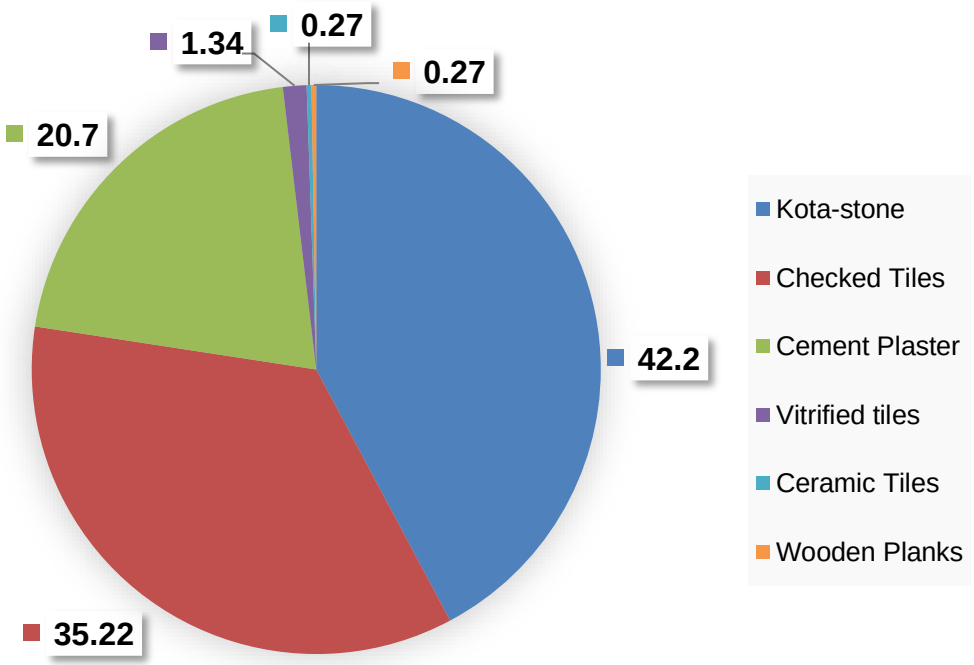


Plate 7: Door in the classroom

4.1B.5. Number of Doors in the Classrooms of the Schools

The data regarding the number of doors in the classrooms of the selected schools (Table 26 and Figure 17)showed that majority of the schools (84.40%) had only one door in the classrooms whereas some of the classrooms were also having two doors (15.10%) and three doors (0.50%) respectively. The rooms with one door cause problems during emergency situations like fire or earthquake. The classrooms with two doors provide ease of movement, and during the emergency situations like fire or earthquake it can play a vital role. Individual entry and exit doors ease the movement during break time every day. One of the classrooms with three doors was connected with other rooms. And the other classroom was having third door which was connected with playground.

Table 26: Number of Doors in the Classrooms of the Municipal Primary Schools

(n=372)

Sr. No.	Number of doors in the classroom	f	%
1	One	314	84.41
2	Two	56	15.05
3	Three	02	0.54
	Total	**372**	**100**

Figure 17: Number of doors in the classroom (n=372)

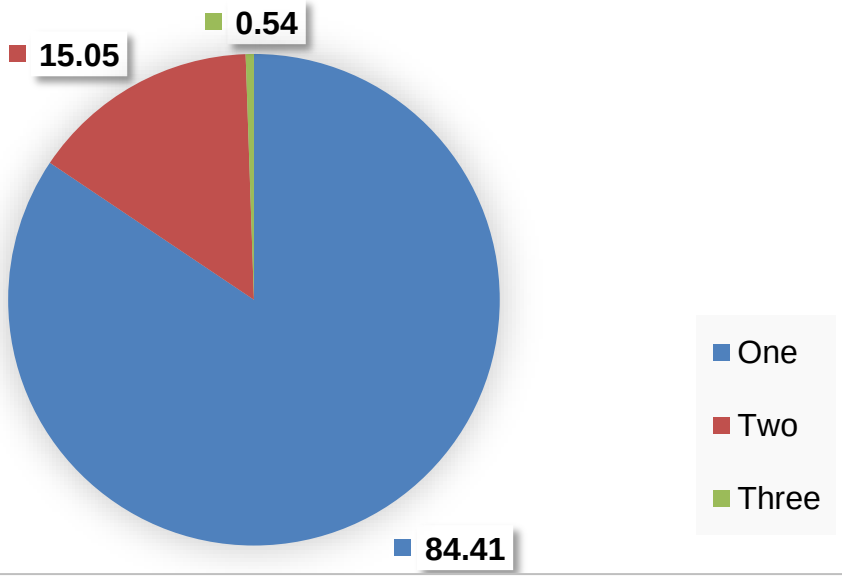


Plate 8: Windows in the classrooms

4.1B.6. Number of Windows in the Existing Classrooms of the Municipal Primary Schools

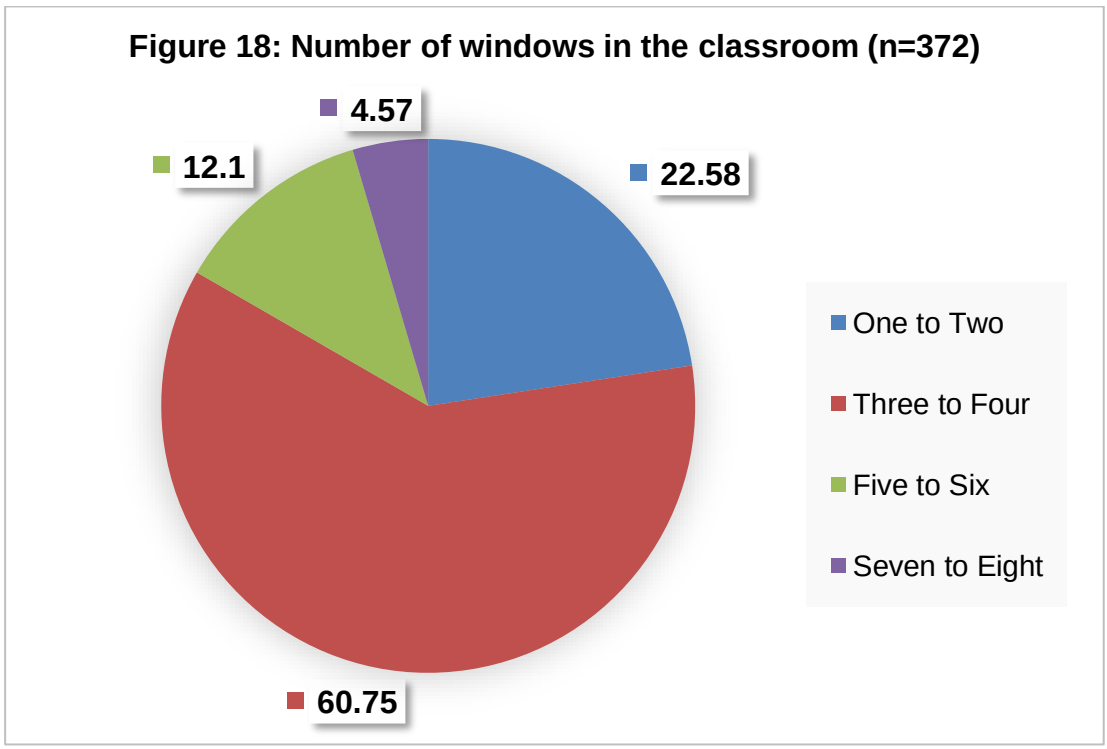
A probe on the number of windows in the existing classrooms of the municipal primary schools (Table 27 Figure18) elicited that 60.80 percent of the schools had classrooms with three to four windows. Further, it was found that a little more than one-fifth of them (22.60%) had classrooms with one to two windows. Few of the selected schools (12.10% and 4.50%) had five to six windows and seven to eight windows in a classroom.

Table 27: Number of Windows in the Classrooms in the Municipal Primary Schools

(n=372)

Sr. No.	Number of Windows in the classroom	f	%
1	One to Two	84	22.58
2	Three to Four	226	60.75
3	Five to Six	45	12.10
4	Seven to Eight	17	4.57
	Total	**372**	**100**

Figure 18: Number of windows in the classroom (n=372)



The windows allowed proper ventilation and illumination in the classroom that helped in reducing the heat and darkness respectively. The researcher had observed that classroom window were located 3'-0" above the floor level and having 4'-0" of height to match the door height which was 7'-0". It was noticed by the researcher that the windows were made of Cast iron material. In some of the school which were located near main road the windows were found to be kept closed all the timeto avoid excess noise and wind. This was making room appear dark, thus in these rooms all the lights were kept open even during daylight (morning shift) time. The lights and closed windows in these classrooms were restricting proper air circulation. The enclosed area was making the classroom feel more humid and causing foul smell trapped in it.

4.1B.7. Number of Artificial Lights in the Classrooms of the Municipal Primary Schools

The data in Table 28 and Figure 19 showed that the 61.10% of the schools had one to two artificial lights in the classroom. However, more than one-third of them (37.30%) had three to four lights in a classroom and very few of them (1.60%) had five to six lights in a classroom. The larger classroom requires more number of lights whereas; if the classroom has provision for sufficient natural light it would not require more number of lights and bulbs.

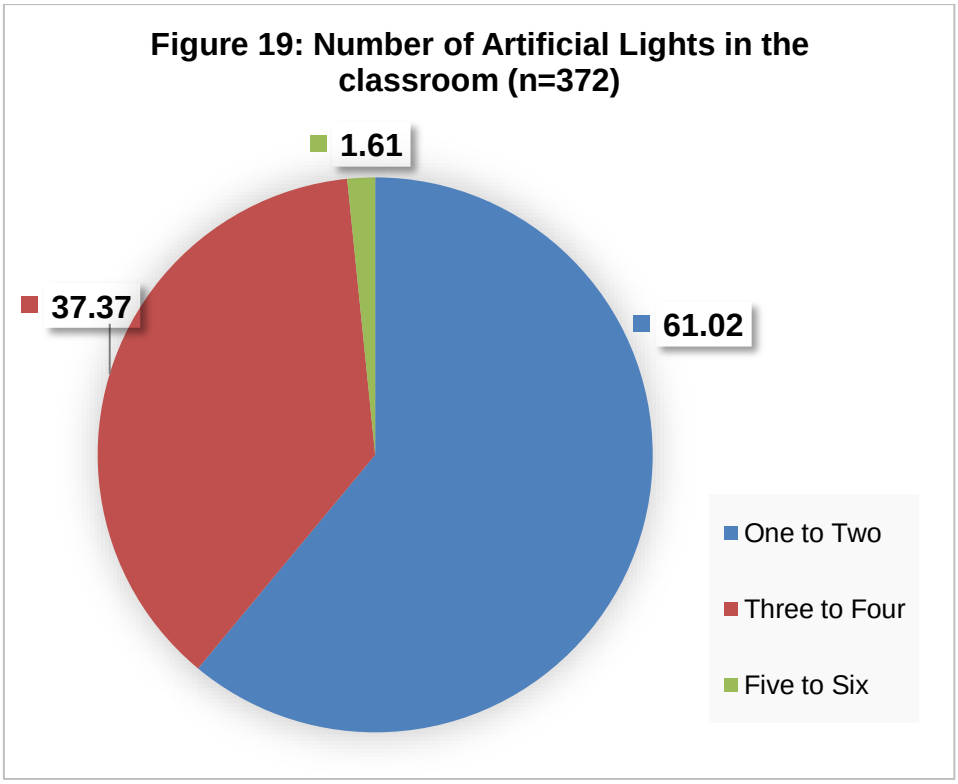
The previous data indicated the presence of proper sunlight in the classrooms as most of the municipal primary school had did not had large size classrooms (Table 22) and three to four windows in it (Table 28). It was observed that to eliminate noise, avoid dust and dirt, the windows were kept closed all the time. The artificial light lit during both morning and afternoon sessions in the classrooms during teaching. The walls and windows were painted in dark blue, brown and gray colours.

The artificial lights were tub-lights and compact florescent (CFL) lights located above the writing board and at the end wall of the room. It was also noticed by the researcher that the windows of the classrooms were kept closed during teaching time in the schools. These darker colours and closed windows were making classroom appear smaller in size. The classrooms were appearing dark, dull and depressing. Chauhan (2015) also mentioned that the proper illumination depends upon the location and design of the windows.

Table 28: Number of Artificial Lights in the Classrooms of the Municipal Primary Schools

(n=372)

Sr. No.	Number of Artificial Lights in the classroom	f	%
1	One to Two	227	61.02
2	Three to Four	139	37.37
3	Five to Six	06	1.61
	Total	**372**	**100**



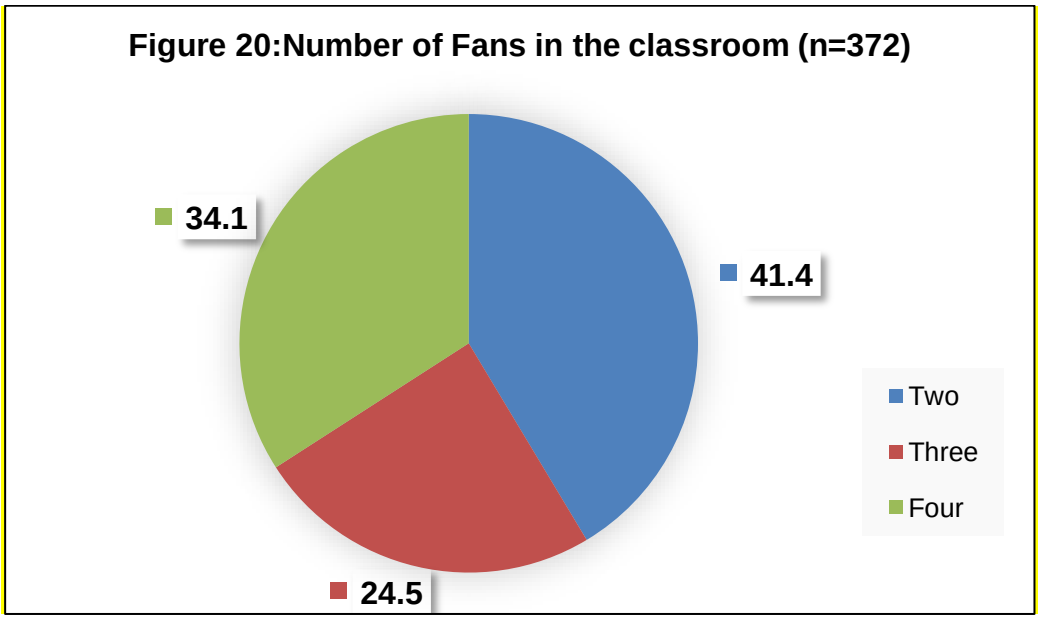
4.1B.8. Number of Fans in the Classrooms of the Municipal Primary Schools

A probe was made to find out the number of fans in the classrooms of the Municipal Primary Schools. Data in table 29and Figure 20 revealed that 41.40percent of the schools had at least two fans in their classrooms whereas 34.10percent of them had four fans in their classrooms. Moreover, nearly one-fourth of the school (24.50%) had three fans in their classrooms. The classrooms with two fans had placed one fan above teacher's table near writing board and other located in centre of the classroom above the students' benches. The classrooms with three fans and four fans were positioned one above teacher's table and the others above the students' benches.

Table 29: Number of Fans in the Municipal Primary Schools (n=372)

Sr. No.	Number of Fans in the classroom	f	%
1	Two	154	41.40
2	Three	91	24.50
3	Four	127	34.10
	Total	**372**	**100**

Figure 20:Number of Fans in the classroom (n=372)



Ideally larger classroom needs one fan above teacher's table and four fans equally located above the students' benches. Four fans were not sufficient for the larger classrooms. The proper number of fans in the classroom can circulate air and removes the foul smell from the classrooms. At the same time, proper circulation of air from fans also decrease the temperature of the classrooms to some extent specially during hot days.

4.1B.9. Average illumination (in lux) during teaching in the Existing Classrooms of the Municipal Primary Schools

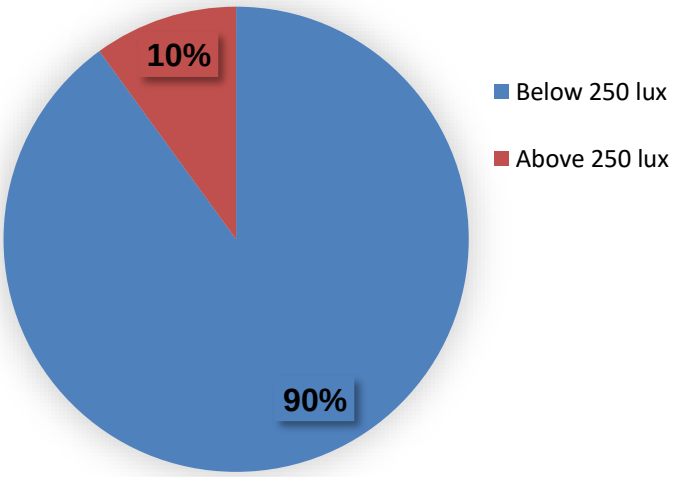
Proper illumination at work place also plays a very important role in improving the efficiency, safety and health of workers. It is said that workplace illumination is among the important parameters influencing worker's productivity in terms of speed, quality of work, downtime, absenteeism and accident rates (Hoffmann et al., 2008).Poor illumination can be a safety hazard and affects the quality of work, specifically in situation where precision is required, and overall productivity of work. The levels of illumination, recorded for two shifts viz. morning (9:30-10:30am) and afternoon (2:30-3:30pm). The level of illumination was recorded with the help of Lux meter and illumination data were collected during February till mid of March of 2020. Due to occurrence of COVID 19 and lockdown the data regarding level of illumination was taken for 60 classrooms only.

Table 30: Distribution of the Classroom according to the Average illumination (in lux) during Teaching in the Existing Classrooms of the Municipal Primary Schools
(n=60)

Recommended level of Illumination (500 Lux)	Municipal Primary School Classrooms	
	f	%
Below 250 lux	54	90.00
Above 250 lux	06	10.00
Total	**60**	**100**

(Appendix- 2)

Figure 21: Recommended level of Illumination (500 Lux) (n=60)



The average illumination (in lux) at the municipal Primary School Class rooms during teaching time was computed and presented here as below and above the recommendation level i.e 250 lux. Majority (90%) of the Municipal Primary School Classrooms had illumination level below the recommended level i.e. 250 lux during teaching in the classrooms and only 10 per cent of the classrooms had illumination above the recommended level i.e 250 lux (Table 30 and Figure 21).

4.1B.10. The Temperature (in ˚C) during Teaching in the Classrooms of the Municipal Primary Schools according to Risk Levels

According to Kroemer and Grandjean (1997), the temperature in winter should be between 20º C and 21º C and in summer between 20º C and 24 º C. The classroom temperature (in ˚C), was recorded for two shifts viz. morning (9:30-10:30am) and afternoon (2:30-3:30pm). In both of the shifts these time were their break time according to their opening time. The classroom temperature (in ˚C),was recorded with the help of Temperature Hygrometer. The data regarding classroom temperature (in ˚C), were collected during February till mid of March of 2020. Due to occurrence of COVID 19 and lockdown situation the data regarding classroom temperature (in ˚C), was taken for 60 classrooms only.

Table 31: Distribution of the Classroom according to the Temperature (in ˚C) during Teaching in the Classrooms of the Municipal Primary Schools according to Risk Levels

(n=60)

Category	WBGT (˚C)	f	%	Flag Colour	Risk Level (For moderate to hard work)
1	≤26.6 ˚C	42	70	White	Minimal
2	26.7 ˚C to 29.3 ˚C	11	18.30	Green	Low
3	29.4 ˚C to 31.0 ˚C	04	6.70	Yellow	Medium
4	31.1 ˚C to 32.1 ˚C	03	5	Red	High
	Total	**60**	**100**		

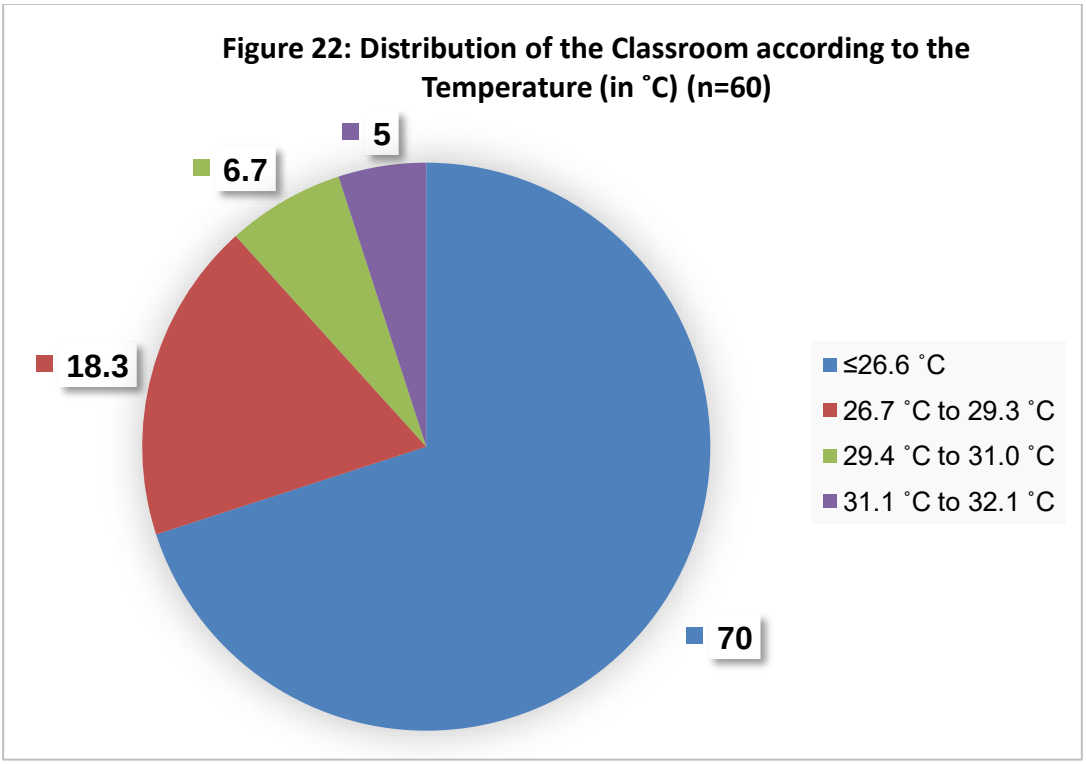


Table 31 and Figure 22 indicated Wet Bulb Globe Temperature (WBGT) during teaching time in the classrooms of the Municipal Primary Schools according to risk levels. It showed that majority of the

classrooms (70.00%) had minimum temperature i.e. <=26.6 ^{0}C and also showcase minimal risk for moderate to hard work. However, nearly one-fifth of them (18.30%) had 26.7 ^{0}C – 29.3 ^{0}C, which indicates low risk. Furthermore, a few of them (6.70%) had temperature showcasing medium which is 29.4 ^{0}C to 31 ^{0}C to high risk (5.00%) which is 31.1 ^{0}C to 32.1 ^{0}C. The municipal primary schools were having old construction building so the wall, floor and ceiling were not in good condition. During afternoon time the temperature increases in March month in Gujarat. It can be assumed that the less number of fans and less ventilation may increase the heat in the classrooms during summer time. These can be of risk for teachers and also for the students. The high temperature may increase the chances of heat stress among humans. It is harmful for health (Chauhan, 2015).

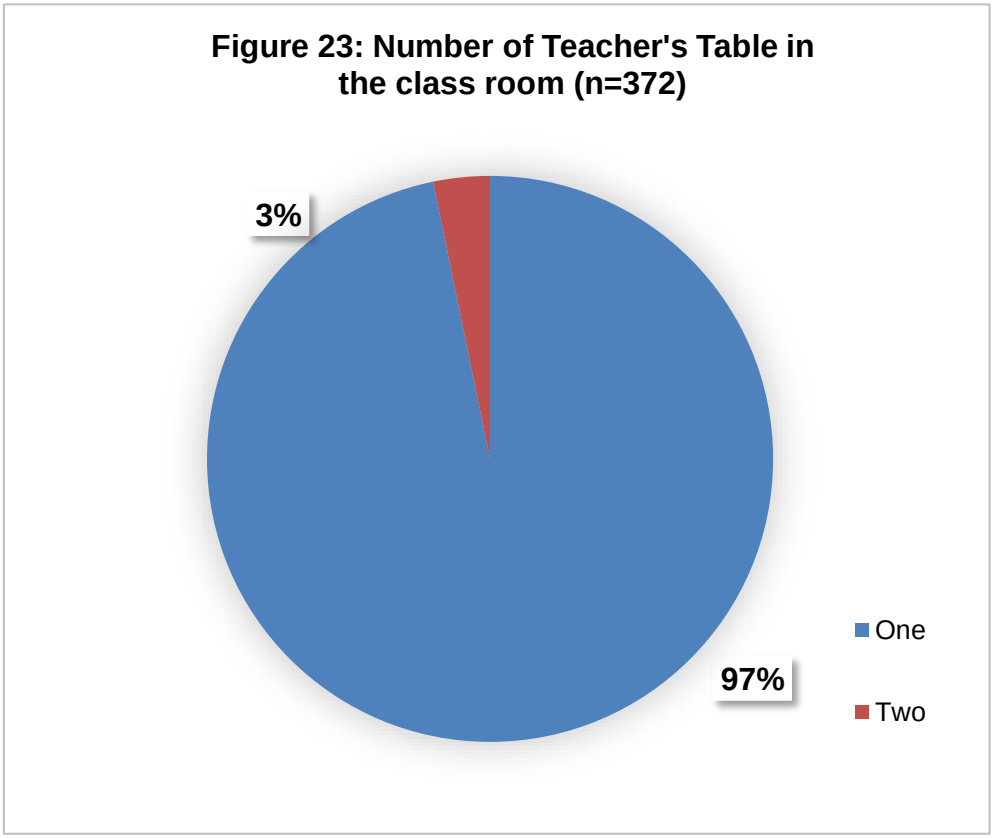
4.1B.11. Number of Tables for the Teachers in the Classrooms of the Municipal Primary Schools

The data regarding the number of tables for the teachers in the classrooms of the selected schools indicated that majority (96.80%) of the schools had only one table for the teacher in the classroom. It was revealed in data that only 3.20 % of them had at two tables for teachers in the classroom. Having more than one table in the classroom was helpful for teachers to use the space for placing their teaching aids like charts, posters, drawing colouring materials, books, bags and attendance book.

Table 32: Number of Tables for the Teachers in the Classrooms of the Municipal Primary Schools

(n=372)

Sr. No.	Number of Teacher's Table in the class room	f	%
1	One	360	96.77
2	Two	12	3.23
	Total	**372**	**100**



The additional table was being used as a storage furniture piece to place needed things related to teaching. However, the space crunch could be one of the reasons for not having more than one table in the classroom. The researcher noticed that the larger classrooms were having two tables.

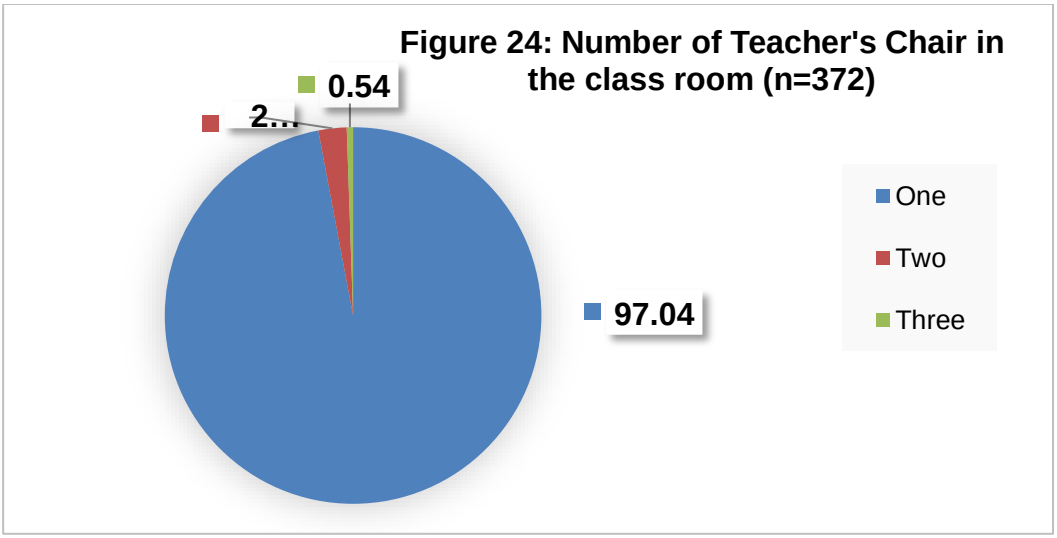
4.1B.12. Number of Chairs for the Teachers in the Existing Classrooms of the Municipal Primary Schools

A probe on number of chairs (Table 33 and Figure 24) elicited that majority of the classrooms (97.04%) had only single chair for the teacher in the classroom. However, it was also found that a very few of them (2.42% and 0.54%) had kept two chairs for the teachers in the classroom. The chair in general made up of wood. It was observed by the researcher that cushions were placed at the back and on seat of the chair in some schools for comfort in seating. The teachers were using extra chair for placing student's note books for checking purpose. Few of the teachers had used cushion for increasing seating height. In some schools plastic chairs were provided for the teachers. Some teachers used two plastic chairs placed one on the other to increase seat height.

Table 33: Number of Chairs for the Teachers in the Existing Classrooms of the Municipal Primary Schools

(n=372)

Sr. No.	Number of Teacher's Chair in the class room	f	%
1	One	361	97.04
2	Two	09	2.42
3	Three	02	0.54
	Total	**372**	**100**

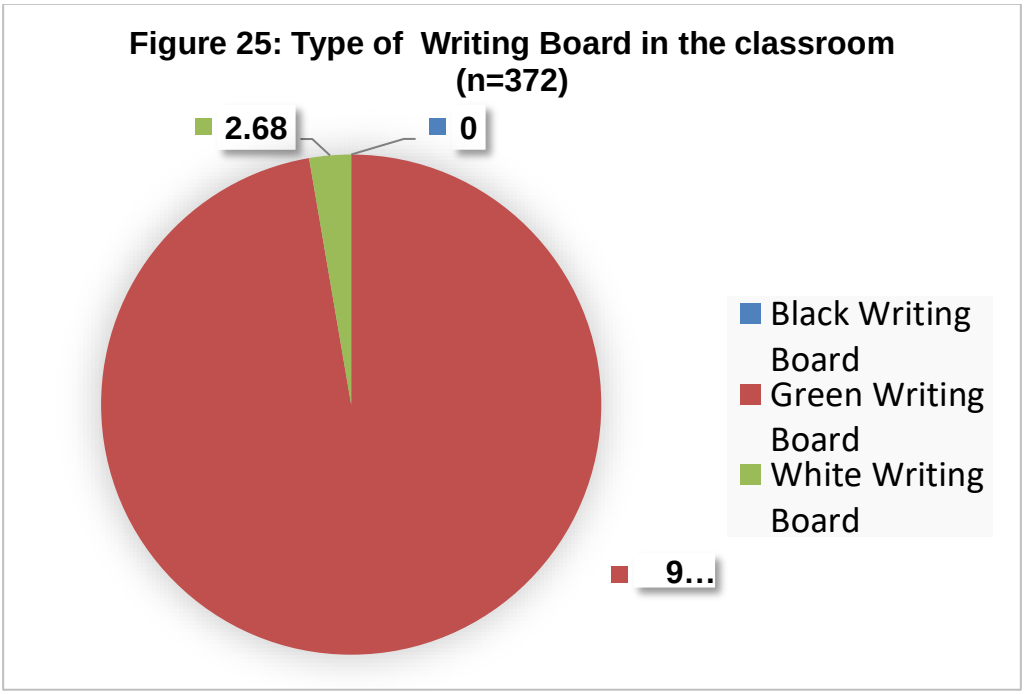


4.1B.13. Number of Writing Board for the Teachers in the Existing Classrooms of the Municipal Primary Schools

A probe on number of Writing Board elicited that all of the classrooms had only single Writing Board for the teacher in the classroom. All the Black Writing Boards were replace with Green Writing Board. The majority of the classrooms (96.77%) had Green Writing Board for the teacher in the classroom. However, it was also found that a very few of them (2.68%) had kept White Writing Board for the teachers in the classroom.

Table 34: Number of Writing Board for the Teachers in the Existing Classrooms of the Municipal Primary Schools (n=372)

Sr. No.	Number of Writing Board in the class room	f	%
	One	372	100
	Type of Writing Board		
1	Black Writing Board	0	-
2	Green Writing Board	362	96.77
3	White Writing Board	10	2.68
	Total	**372**	**100**



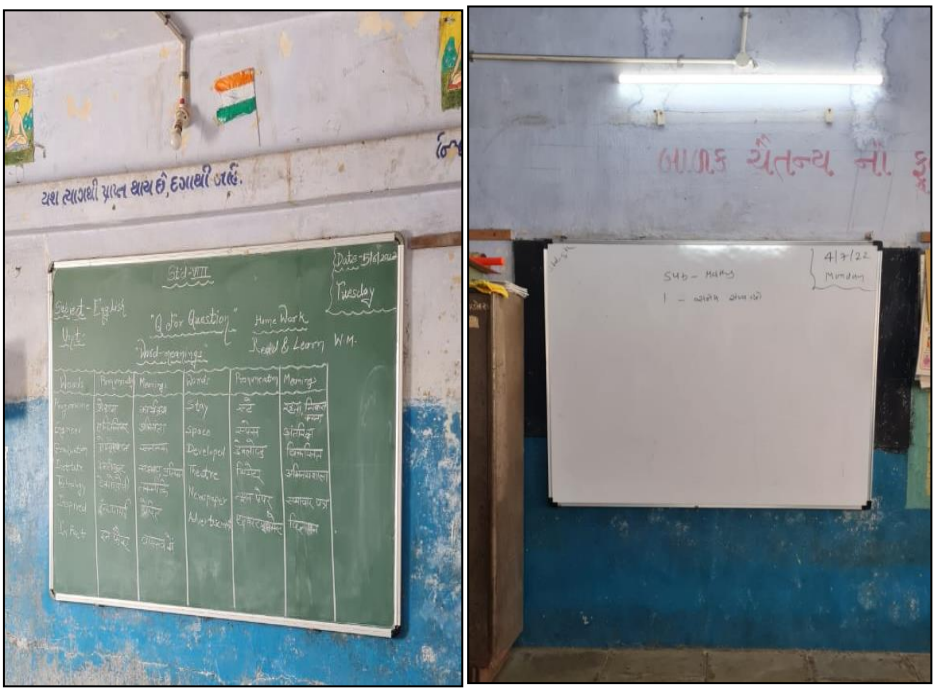


Plate 9: Writing Board in the class room

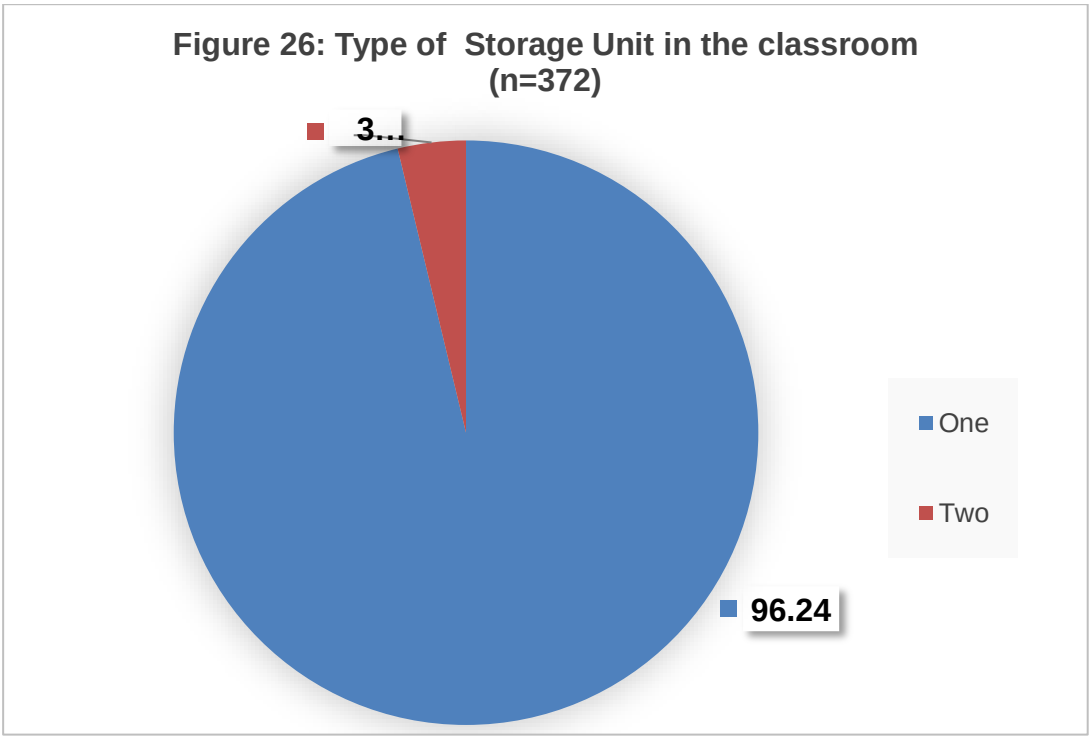
4.1B.14. Number of Storage Unit for the Teachers in the Classrooms of the Municipal Primary Schools

The data regarding the number of storage unit for the teachers in the classrooms of the selected schools indicated that high percentage (96.24%) of the schools had only one storage unit for the teacher in the classroom. It was revealed in data that only 3.76 % of them had at two storage units for teachers in the classroom. Having more than one storage unit in the classroom was helpful for teachers to use the storage unit space for storing their teaching aids like charts, posters, drawing colouring materials, books, bags and attendance book. In short the storage unit was used as a furniture piece to put needed things near to the teacher by the teacher. However, the space crunch and lack of funding could be one of the reasons for not having more than one storage unit in the classroom. The researcher noticed that the larger classrooms were having two storage units.

Table 35: Number of Storage Unit for the Teachers in the Classrooms of the Municipal Primary Schools

(n=372)

Sr. No.	Number of Teacher's Storage Unit in the class room	f	%
1	One	358	96.24
2	Two	14	3.76
	Total	**372**	**100**



Section-4.2: Perceived Comfort Level of the Respondents Regarding the Existing Facility in the Class room

This section covers data on perceived comfort level of the respondents regarding the existing facility in the class room, while using writing boards, storage units, and physical facilities like table, fans and lights. The section also throws light upon the perceived comfort level of the selected respondents at their workplace.

4.2.1. Perceived Comfort Level of the respondents while using Writing Board in the classroom

The perceived comfort level while using writing board in the classroom contained items that referred to the respondent's degree of comfort regarding the usage of writing board. It had three point continuum for the responses "Highly Comfortable", "Fairly Comfortable" and "Not at all Comfortable" which were scored 3 to 1 respectively.

Table 36: Perceived Comfort Level of the respondents while using Writing Board in the classroom

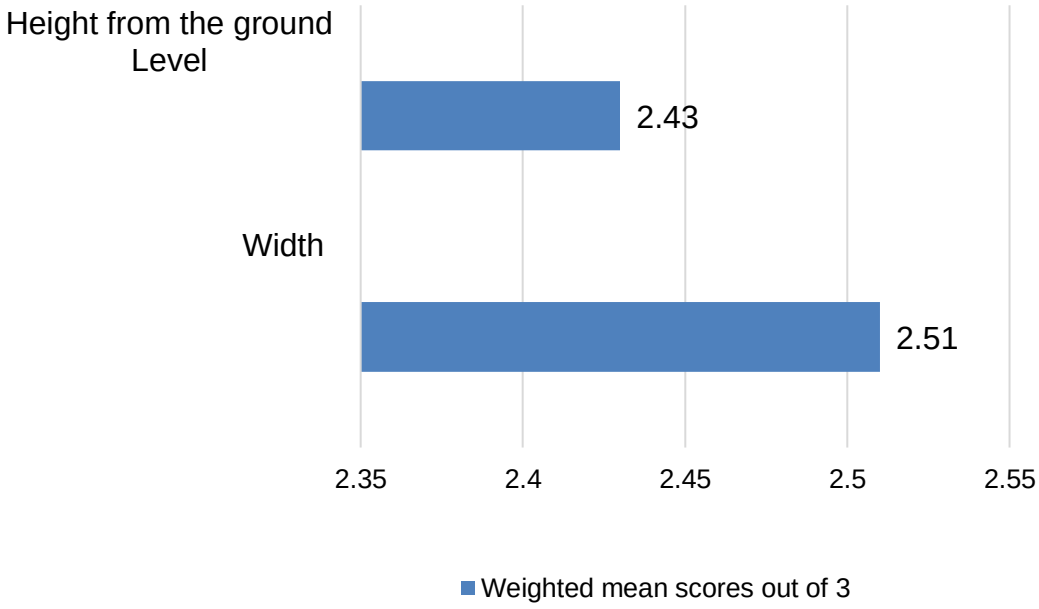
(n=372)

Perceived Comfort Level / Writing Board	Highly Comfortable 3		Fairly Comfortable 2		Not at all Comfortable 1		Weighted mean scores out of 3
	f	%	f	%	f	%	
Width	206 (1.66)	55.37	148 (0.80)	39.80	18 (0.05)	4.83	2.51
Height from the ground Level	182 (1.47)	48.92	170 (0.91)	45.70	20 (0.05)	5.38	2.43
						Total	2.47

The data in Table 36 and Figure 27shows weighted mean scores for the width of the writing board was more preferred than the weighted mean scores of height of the writing board from the ground Level. The data presented in table 36 highlights that nearly fourty percent of the respondents (39.80%) were fairly comfortable with the white board in

relation to its width while writing on it (right to left). The data regarding the comfort level of respondents further showed that few of the respondents (4.83%) and (5.38%) were not at all comfortable with the width and height of the writing board respectively while using it. The comfort levels of the respondents were less with the height of the writing board as compared to its width.

Figure 27: Perceived Comfort Level of the respondents while using Writing Board in the classroom (n=372)



The height of the writing board should be such that it should be visible to all the students of the classroom. Arif and Sevilay (2006) mentioned that the writing board is an essential thing in a classroom, so teacher should carefully use it in a way that the content written on it is visible to each student. According to the Indian Standards Institution (2006) the writing board should be 31.49” inches (800 millimetres) above the floor level and should be placed near the window wall.

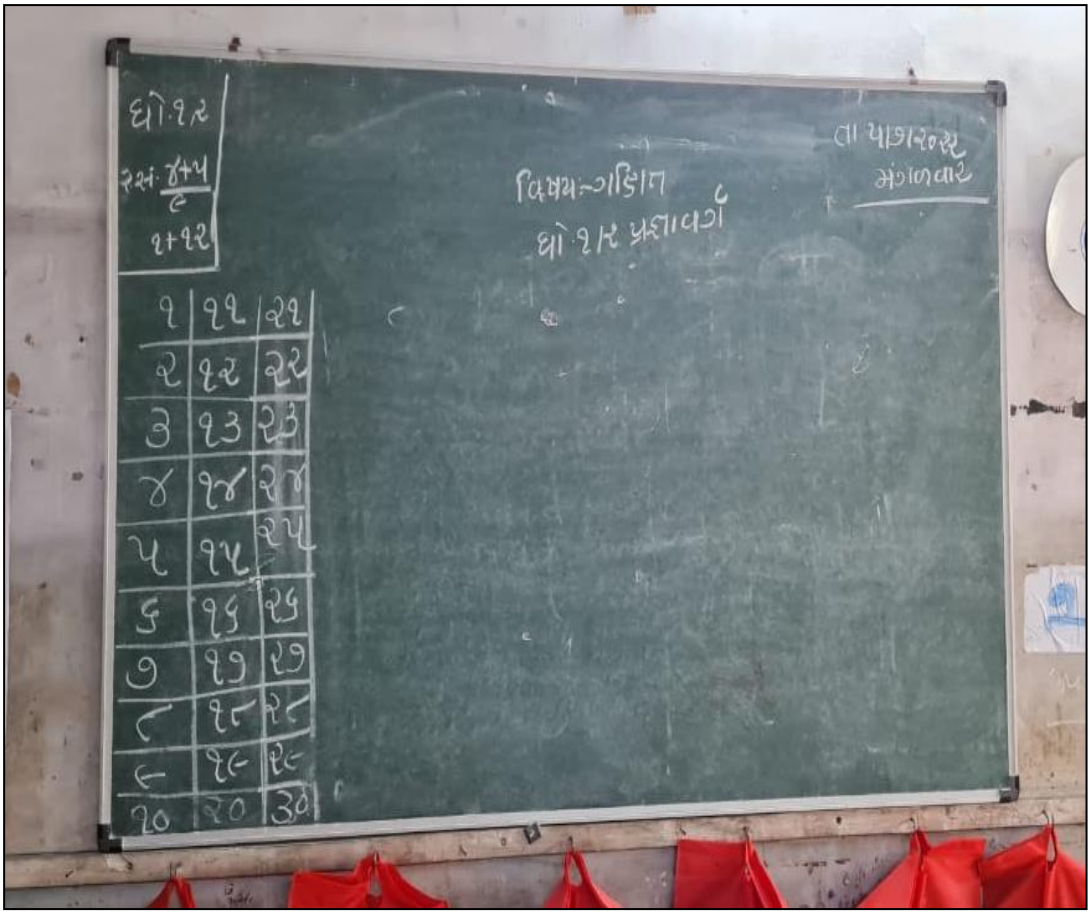


Plate10: Image of Green Writing Board mounted on Classroom Wall

The schools and institutions use these standards recommended by ISI to ensure the maximum reach of the respondents. However, sometimes due to the physique of the teachers, they face difficulty in using these writing boards. The short height of the teacher may restrain them to take full use of writing board in the classroom. Thus it would be advised that the writing board with adjustable height should be provided for the respondents having different heights or the provision of raised wooden plank be used to make the use of writing board more comfortable for the teachers with low height.

4.2.2. Perceived comfort level of the respondents while using Storage Unit in the classroom

The perceived comfort level while using storage unit in the classroom referred to the respondent's degree of comfort level experienced by them in the usage of storage unit. It had three point continuum for judging the responses as "Highly Comfortable", "Fairly Comfortable" and "Not at all Comfortable" which were scored 3 to 1 respectively. Table 37 shows the data regarding the perceived comfort level of the teachers while using storage unit in the classroom. 8.33 percent of the respondents were not happy with the depth of the shelf of drawers provided to them in storage unit in the classroom.

Table 37: Perceived Comfort Level of the respondents while using Storage Unit in the classroom

(n=372)

Perceived Comfort Level / Storage Unit	Highly Comfortable 3		Fairly Comfortable 2		Not at all Comfortable 1		Weighted mean scores out of 3
	f	%	f	%	f	%	
The Depth of the shelf in Storage Unit.	165 (1.33)	44.36	176 (0.95)	47.31	31 (0.08)	8.33	**2.36**
						Total	2.36

The storage unit of the classroom were made up of Iron. They were old, big, strong storage units having brown and gray colour applied to it. The storage units were not easily moved they were pre-fabricated storage units having two doors. The dimensions of the storage unit were 36" Length X 16" Depth X 76" Height. However, the surface of storage unit was uneven dented, scratches were prominent and the colour was fading away due to age of the storage unit.The storage units of the classroom are generally used for storing the informative education communication (IEC) materials for teaching and also the notebooks of students.

Plate 11: Image of Storage Unit in the Classroom

Indian Standard Institute (2006) recommended that the depth of cupboard in the classrooms should not be less than 18” inches (450 millimetres). It was also noticed that respondents with short height (shorter stature) were facing difficulties while placing notebooks or other teaching articles in the upper storage unit shelf. The mean height of the respondents was 61 inches (5’-1” inch) as seen in table 47. Those respondents who were not comfortable with the depth of the storage unit might be facing issues due to the lack of storing capacity of the storage unit they were not able to reach the upper compartments of the storage units. Thus it would be advisable that storage unit with adjustable height shelf be provided to the respondents who were

having short height (shorter stature) or provision of a raised wooden stool to access the material on the upper shelves.

4.2.3. Perceived Comfort Level of the respondents while using Chair in the classroom

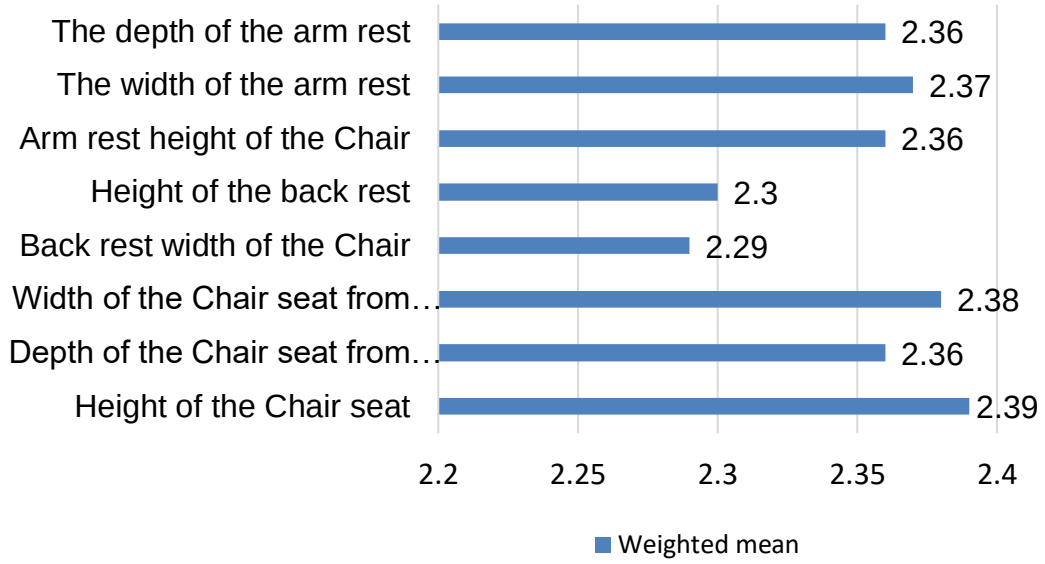
The perceived comfort level while using chair in the classroom contained items that referred to the respondent's degree of level of comfort regarding the usage of chair in the classroom. It was adjudged on three point continuum for the responses "Highly Comfortable", "Fairly Comfortable" and "Not at all Comfortable" which were scored 3 to 1 respectively.

Table 38: Perceived Comfort Level of the respondents while using Chair in the classroom

(n=372)

Perceived Comfort Level / Aspect of Chair	Highly Comfortable 3		Fairly Comfortable 2		Not at all Comfortable 1		Weighted mean scores out of 3
	f	%	f	%	f	%	
Height of the Chair seat	172 (1.39)	46.23	173 (0.93)	46.50	27 (0.07)	7.27	**2.39**
Depth of the Chair seat from front to back	160 (1.29)	43.00	186 (1)	50.00	26 (0.07)	7.00	**2.36**
Width of the Chair seat from left side to right side	166 (1.34)	44.62	178 (0.96)	47.85	28 (0.08)	7.53	**2.38**
Back rest width of the Chair	142 (1.15)	38.17	195 (1.05)	52.42	35 (0.09)	9.41	2.29
Height of the back rest	150 (1.21)	40.32	185 (0.99)	49.73	37 (0.10)	9.95	2.30
Arm rest height of the Chair	162 (1.31)	43.55	178 (0.96)	47.85	32 (0.09)	8.60	2.36
The width of the arm rest	167 (1.35)	44.90	174 (0.94)	46.77	31 (0.08)	8.33	**2.37**
The depth of the arm rest	164 (1.32)	44.08	179 (0.96)	48.12	29 (0.08)	7.80	**2.36**
						Total	2.35

Figure 28: Perceived Comfort Level of the respondents while using Chair in the classroom (n=372)



The data in Table 38 highlighted that a few of the respondents (9.40%, 9.95% and 8.60%) were not at all comfortable with the width and height of the back rest of the chair they use as well as the height of the arm rest of the chair. It was also noticed that some of them (7.27%, 7.00% and 7.53%) reported that they were not at all comfortable with the height, depth and width of the chair. The respondents (8.33% and 7.80%) were also not at all comfortable with the width and depth of the arm rest of the chair. While comparing the aspects of the chair used by the respondents, the height of the back rest and the width of the back rest of the chair were found to be least comfortable as perceived by the respondents.

The chairs were having metal body and back rest and chair seat were made up of wood. Due to the chair being old, the paint was torn off and in few chairs the armrests had been fallen off. The arm rest colour was black oil paint. The wood texture pattern laminates were applied on the back rest and chair seat. The metal surface of chair body was originally been painted with gray oil paint colour.

Plate 12: Images of Chair in the Classroom

The dimensions of chair were same in all the school because it was

mass produced to be used in schools. The Height of the Chair was 38.5", Height of the Chair seat 19"and Width of the Chair from left side to right side was 22". This type of chairs can be seen in other government offices and other institutes like hospital, health centers and courts. Alnaser and Wughalter (2009) discussed that the comfort level of a chair could be associated with well-being, aesthetics, and impression of its user whereas the discomfort could be associated with fatigue and physical issues related to body joints muscular contractions and blood circulation. It could be inferred from the present data that those teachers who were facing some physical issues like back ache, joint problems and so on, might be finding the chairs they use as not comfortable. Thus, it would be advisable that the chairs and tables with adjustable height be provided to the teachers along with a soft padded cushion on the seat and at the back of the chair.

4.2.4. Perceived Comfort Level of the Respondents while using Writing Table in the classroom

The perceived comfort level referred to the respondent's degree of comfort level regarding the usage of writing table. It was judged on three point continuum for the responses "Highly Comfortable", "Fairly Comfortable" and "Not at all Comfortable" which were scored 3 to1 respectively.

Table 39: Perceived Comfort Level of the respondents while using Writing Table in the classroom

(n=372)

Perceived Comfort Level	Highly Comfortable 3		Fairly Comfortable 2		Not at all Comfortable 1		Weighted mean scores out of 3
Writing Table	**f**	**%**	**f**	**%**	**f**	**%**	
Height of the Writing table	182 (1.47)	48.92	164 (0.88)	44.08	26 (0.07)	7.00	2.42
Width of the Writing table	186 (1.50)	50.00	160 (0.86)	43.00	26 (0.07)	7.00	2.43
Length of the Writing table	190 (1.53)	51.08	157 (0.84)	42.20	25 (0.07)	6.72	**2.44**
						Total	2.43

Figure 29: Perceived Comfort Level of the respondents while using Writing Table in the classroom (n=372)

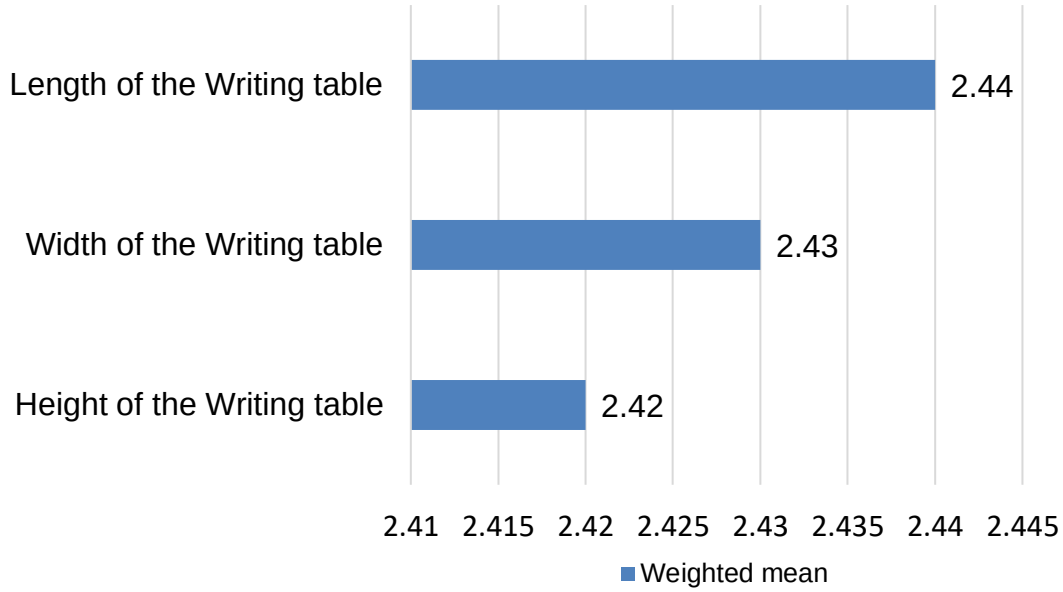


Table 39and Figure 29 reveals that the comfort level of the teachers while using writing table in their classrooms. The findings shows that 7.00%, 7.00% and 6.72% of the respondents were not comfortable with the height, width and length of the writing table respectively.

The table had metal legs and top frame. The tabletop had similar wood patterned laminate as chair in the classroom. Table was having 4'-0" Length X 2'-0" Breadth X 2'-6" Height in dimension. The metal legs were having black colour painted on it. It has been found that the respondents perceived height of the table as least comfortable as compared to its width and length. The anthropometric measurements of the user generally define the height and width of the table. The adjustable table as per the height of the teacher is suggestive to avoid the discomfort level of the teachers while using writing table in the classroom.

Plate 13: Image of Writing Table in the Classroom

4.2.5. Perceived Comfort Level of the Respondents while using Miscellaneous Physical Arrangements in the classroom

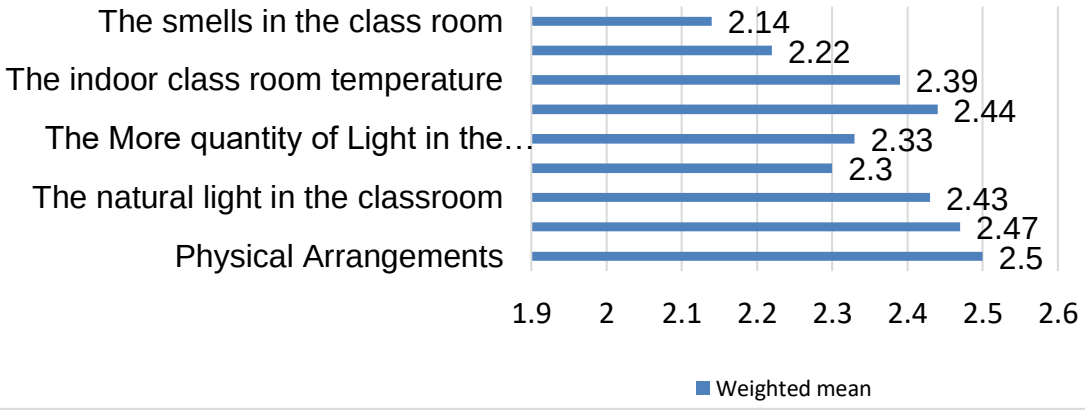
Perceived comfort level while using miscellaneous physical arrangements of the classroom referred to the respondent's degree of perceived comfort level regarding the use of miscellaneous physical arrangements in the classroom. It had three point continuum for the responses "Highly Comfortable", "Fairly Comfortable" and "Not at all Comfortable" which were scored 3 to 1 respectively. Based on the weighted mean scores the findings revealed that the respondents were least comfortable with the "smell in the classroom" followed by "noise" and "less light" (Table 40).

Table 40:Perceived Comfort Level while using Miscellaneous Physical Arrangements in the classroom

(n=372)

Perceived Comfort Level / Miscellaneous Physical Arrangements	Highly Comfortable 3		Fairly Comfortable 2		Not at all Comfortable 1		Weighted mean scores out of 3
	f	%	f	%	f	%	
The placement of Fans	196 (1.58)	52.69	165 (0.89)	44.35	11 (0.03)	2.96	**2.50**
The placement of Lights	194 (1.56)	52.15	162 (0.87)	43.55	16 (0.04)	4.30	**2.47**
The natural light in the classroom	176 (1.42)	47.31	180 (0.97)	48.39	16 (0.04)	4.30	2.43
The effects by Less light in the classroom	140 (1.13)	37.63	205 (1.10)	55.11	27 (0.07)	7.26	2.30
The More quantity of Light in the classroom	144 (1.16)	38.72	207 (1.11)	55.64	21 (0.06)	5.64	2.33
The class room air circulation	184 (1.48)	49.46	169 (0.91)	45.43	19 (0.05)	5.11	**2.44**
The indoor class room temperature	169 (1.36)	45.43	180 (0.97)	48.39	23 (0.06)	6.18	2.39
The noise in the class room	143 (1.15)	38.44	172 (0.92)	46.24	57 (0.15)	15.32	2.22
The smells in the class room	117 (0.94)	31.45	192 (1.03)	51.61	63 (0.17)	16.93	2.14
						Total	2.35

Figure 30: Perceived Comfort Level while using Miscellaneous Physical Arrangements in the classroom (n=372)



The data in Table 40 shows the data regarding the comfort level of the teachers with the miscellaneous physical arrangements of the classroom. The Table 40 highlighted that 16.90 percent of the respondents were not comfortable while teaching in the classroom with the existing smell in it. There were 15.30% respondents who were uncomfortable with the noise in the classroom. This noise could be due to vehicles passing on the road coz schools were located near the main transportation roads of the city. It was also found that the less light and excess light was also on the aspect of physical arrangements that lead to discomfort among the respondents while teaching.

More quantity of light, air circulation and temperature in the classroom they teach. Putehaet.al. (2017) also expressed their concern for the teaching and learning environment of the classroom and stressed upon providing a proper thermal environment at classrooms so that teachers and students can spend their time with ease and without letting the temperature of the classroom to affect the teaching learning process. It was understood that if the ventilation in classroom is not proper, it will definitely going to affect the teaching learning process. According to the Indian Standards Institution (2006), the classrooms should have provision for the admission of light and air and there should be one or more aperture for the same like windows, fan and lights. The doors and window should open directly to the external air or into an open corridor (varandah). Nuryadin (2013) found that the noise in classroom affects the teaching and learning process in the classroom and controlling it may increase the concentration of students on their lessons. This would also help their teachers in teach them effectively.

SECTION4.3A: Postural Analysis of the Municipal Primary School Teachers

The posture of respondents during teaching was analyzed using Ovako Working Posture Analyzing System (OWAS) method (Finish Occupational Health and Safety, 1992). In this method 4 codes are determined according to intensity of the postures. The four postures for the present study were finally categorized as Normal Posture, Stressful Posture, Harmful Posture and Very Harmful Posture based on their intensity of the posture according to OWAS.

The category one is Normal Postures integrated Both Hands Below elbow Joint, Both Hands Relax, Sitting Position, Standing with Arms and Legs Upright and Standing Straight Position.The category two is Stressful Postures included 20° Neck Forward Bent, Leaning Froward, One Hand above Elbow Joint, Slightly bending, Standing with one Leg Bent, Standing with one Leg UprightPostureand Walking.The category three is Harmful Postures incorporated60° Neck Forward Bent, Both Hands above Elbow Joint, Both Hands Parallel to Shoulder, Full Bent Forward and Standing with Both Legs Bent Posture. And category four is Very Harmful Postures included 60° Neck Backward Bent, Kneeling on One or Both Knees, Leaning Forward and FlexionPosture.

The researcher had identified 20 different postures that the respondents adopted while teaching in the school classroom. These identified postures were converted in figures. These figures were incorporated in the questionnaire where in the respondents and were asked to tick mark the figures adopted by them while teaching in the school classrooms. The most relevant figures adopted while teaching in classroom were ticked marked by the respondents. The figures of Municipal Primary School Teacher postures were then categorized as Normal Posture, Stressful Posture, Harmful Posture and Very Harmful Posture using the OWAS technique. The postural figures were modified by the researcher (Appendix- 2).

4.3A.1. Overall Posture Analysis of RespondentsTeachers Showing Postures according to their action categories

The table 41 presented data were received on the basis of multiple responses. It shows that 24.89 per cent of the respondents were teaching in normal posture and scored 1 in OWAS scale. However, the remaining 23.44%, 11.15% and 4.24%were teaching in bad postures viz. stressful posture harmful posture and very harmful postures. The findings clearly indicated that the selected teachers were teaching in a posture that could affect their physical health in long term. The finding shows that 23.44 per cent of the respondents adopted stressful posture which could be modified by them in near future by avoiding. The data also revealed that 11.15 per cent of the respondents adopted harmful posture category and must modify the postures as soon as possible. And 4.24per cent of the respondents adopted very harmful posture. The teaching work must be ceased and modification of the postures must be done immediately. Thus, the researcher planned an intervention program for the respondents to improve their postures for reducing musculoskeletal discomfort leading to better healthy life.

Table 41: Overall Posture Analysis Showing Postures according to their action categories

(n=372)

Action Categories on the basis of OWAS	f	Mean Percentage (%)
Action Category - 1 - Normal Postures	926	24.89
Action Category - 2 - Stressful Postures	872	23.44
Action Category - 3 - Harmful Postures	415	11.15
Action Category - 4 - Very Harmful Postures	158	4.24

Note: Total exceeds due to multiple responses.

An overview of the comparisons made between the four categories of the postures adopted by the respondents while teaching in the classroom (Table 46)Highlighted that 4.24 % of the respondents had adopted the most unhealthy posture “Very Harmful” Followed by “Harmful posture” (11.15%) and “Stressful posture” (23.44%).

4.3A.2. Posture Analysis of the respondents teaching in Normal Posture

The data presented in this table were received on the basis of multiple responses. Table 42and Figure 31 shows the teachers teaching in normal posture and scored 1 in OWAS scale. It can be inferred from the data presented in table 36 that majority of the teachers (74.46%) were teaching in the standing straight posture and 59.14% were reported teaching in the sitting position. Furthermore, the other postures in which the teachers used to teach were standing with arms and legs upright (44.62%), both hands below elbow joint (40.32%) and both hands relax (30.38%). All the above five postures adopted by the respondents while teaching were considered as normal posture.

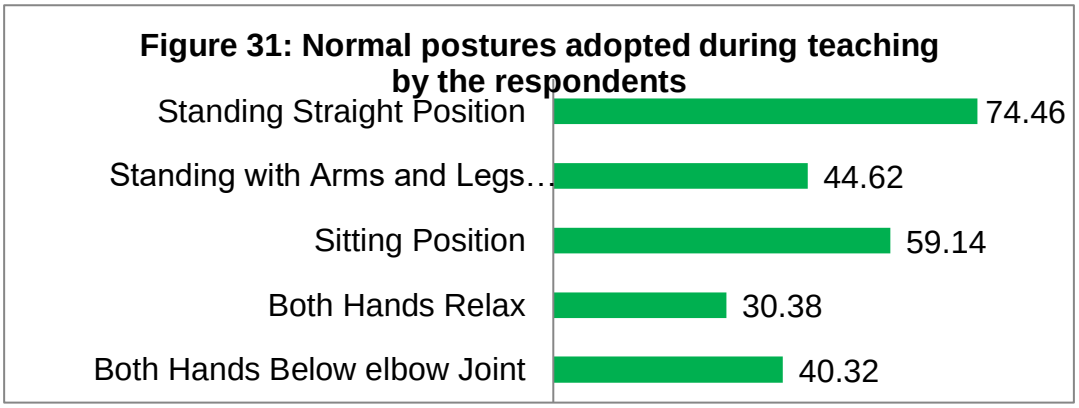
Table 42: Posture Analysis of the respondents teaching in Normal Postures

(n=372)

Normal postures adopted during teaching	f	%
Both Hands Below elbow Joint	150	40.32
Both Hands Relax	113	30.38
Sitting Position	220	59.14
Standing with Arms and Legs Upright	166	44.62
Standing Straight Position	277	74.46
Mean percentage		**24.89**

Note: Total exceeds due to multiple responses.

Figure 31: Normal postures adopted during teaching by the respondents



The researcher observed that the respondents who were teaching languages like Gujarati, Hindi and English were teaching in sitting

position. The respondents who taught subjects like Science, Maths and Drawing preferred standing straight posture while teaching. The above were the postures that come under the normal posture category of OWAS posture analysis. The researches have confirmed the benefits of good posture that affect the person positively. It tends to increase self esteem, control mood swings, decrease fear, increase attractiveness and more preparedness for risk taking. **(Kounter, 2019; Nair et. al. 2015; Hansraj 2014)**

4.3A.3. Posture Analysis of the respondents teaching in Stressful Posture

Table 43 and Figure 31 indicated the stressful postures that teachers adopted while teaching at their respective schools. The results regarding stressful postures were received on the basis of multiple responses. It revealed that most of them (68.82%) were teaching in the posture where they keep one hand above the elbow joint. 46.97% used to walk while teaching in the classroom. However, 34.14% lean forward to teach whereas, 31.45% equally were teaching with 20° neck forward bent and standing with one leg upright posture. Furthermore, it was also noted that few of them (13.98% and 8.60%) had adopted the posture of getting their body slightly bent and standing with one leg bent while teaching.

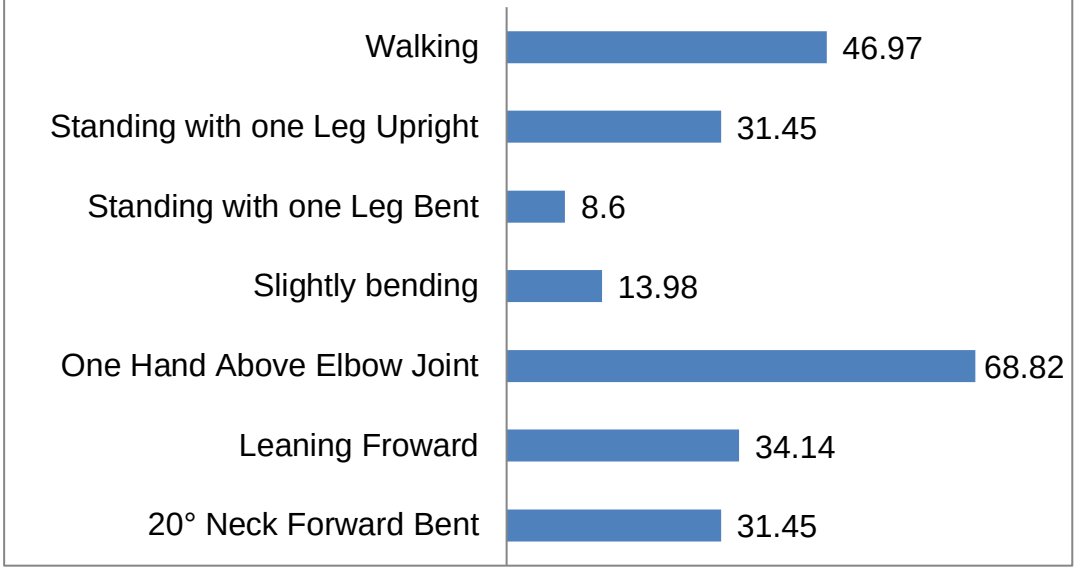
Table 43: Posture Analysis of the respondents teaching in Stressful Posture

(n=372)

Stressful postures adopted during teaching	f	%
20° Neck Forward Bent	117	31.45
Leaning Froward	127	34.14
One Hand Above Elbow Joint	256	68.82
Slightly bending	52	13.98
Standing with one Leg Bent	32	8.60
Standing with one Leg Upright	117	31.45
Walking	171	46.97
Mean percentage		**23.44**

Note: Total exceeds due to multiple responses.

Figure 32: Stressful postures adopted during teaching by the respondents



The postures like 20° Neck Forward Bent, Leaning Froward and slightly bending were adopted by the teachers to inspect students' work and for checking notes while teaching. This prolonged postural behaviour lead to musculoskeletal pain and discomfort. These postures are risk factors to certain illnesses and may cause long term effects on body. They are categorized as the stressful postures in the OWAS method. It is noticeable that the teachers may tend to use single posture to teach, over the years. This prolonged postural behaviour may cause damage to their body structure and result in musculoskeletal pain. Individual's standing posture may degrade after longer periods of time and that may stay for lifetime. **(Kounter, 2019)**

4.3A.4. Posture Analysis of the respondents teaching in Harmful Posture

Table 44 shows the harmful postures that the selected respondents had adopted during teaching. The results were received on the basis of multiple responses. The finding reported that 41.13% of the respondents were keeping both their hands above the elbow joint while teaching. It also showed that 28.76%were teaching with60°Neck forward bent posture. Moreover, they were also found teaching in posture where both hands were parallel to shoulders (12.63%), Full

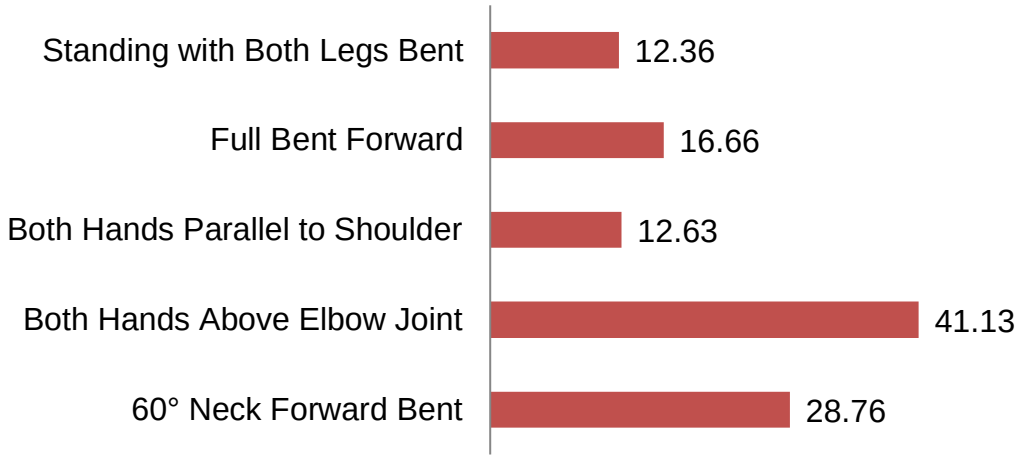
bent forward (16.66%) and standing with both legs bent (12.37%). These postures are harmful and risky for physical well being of teachers in long term. **Chiu TT and Lam PK (2007**) found a significant and positive association between the 'head down' posture with neck pain. Teachers experienced this while prolonged engagement in students' assessment and preparing their lesson plan. Further, the neck pain among teachers was also found to be positively correlated with computer processing. **(Eric and Smith, 2011)**

Table 44: Posture Analysis of the respondents teaching in Harmful Posture
(n=372)

Harmful postures adopted during teaching	f	%
60° Neck Forward Bent	107	28.76
Both Hands Above Elbow Joint	153	41.13
Both Hands Parallel to Shoulder	47	12.63
Full Bent Forward	62	16.66
Standing with Both Legs Bent	46	12.37
Mean Percentage		**11.15**

Note: Total exceeds due to multiple responses.

Figure 33: Harmful postures adopted during teaching by the respondents



Use of harmful postures may lead to neck pain due to the prolonged sitting and neck bend for reading, working on computer or laptop. The

human body is more suited for movement in which it must bear its weight against gravity. **Kounter (2019)** recommended that individuals should raise their electronic device to a level that allows for only a slight neck bending for up to ten degree. The musculoskeletal pain can interfere in the routine life of a teacher that may result in absenteeism. It has been reported and found that the prolonged exposure of unfavourable working condition like physical exertion and increased work load create health risk among teachers. **(Korkmaz et. al. 2011)**

4.3A.6. Posture Analysis of Respondents Showing Very Harmful Postures

Those teachers who scored 4 in OWAS scale were considered to be adopting very harmful postures while teaching (Table 45). The data were arrived on the basis of multiple responses. It was observed that the respondents were found teaching in very harmful posture too. These postures were affecting their health and increase in work related health issues like neck pain, spinal injury and headache. It was found that 15.59%, 14.78% and12.10% of the respondents were teaching with “lean forward and flexion posture”, “kneeling on one or both knees” and “60° neck backward bent posture”, respectively.

Table 45: Posture Analysis of the respondentsadopting Very Harmful Posture

(n=372)

Very Harmful Postures adopted during teaching	**f**	**%**
60° Neck Backward Bent	45	12.10
Kneeling on One or Both Knees	55	14.78
Leaning Forward and Flexion	58	15.59
Mean Percentage		**4.24**

Note: Multiple Responses.

Figure 34: Very Harmful postures adopted during teaching by the respondents

Yueet. al. (2012) found the prevalence of neck and shoulder pain and low back pain among school teachers in China. The main factors causing the musculoskeletal pain were their prolonged sitting and static postures. Comparing these results to our study shows that the respondents (teachers) of Municipal Primary School were at higher risk for developing musculoskeletal discomfort. According to the results, ergonomic interventional programs seem to be necessary. The researcher recommends that exercise, frequent rests, creating awareness among the respondents to avoid them is essential though intervention programme.

Section4.3B: Anthropometric Data of the Respondents

The present section dealt with the information regarding the anthropometric data of the Municipal Primary School Teachers. Mean, Standard Deviation for the anthropometric data were computed by the researcher.

4.3B.1. Anthropometric data of the Respondents

The data in table 41 clearly states the mean Height (Stature) of the respondents was recorded as 155.07 centimetres (5'-1").The mean weight of the respondents was measured as 62.92 kilograms. The researcher had observed that 38.44%of the respondents were falling under overweight category as confirmed from their BMI where 17.21% of the respondents were found to be obese.

Table 46: Distribution of Respondents according to their Anthropometric Measurements

(n= 372)

Anthropometric Data of the respondents		**Respondents**	
Height in centimetres		**f**	**%**
105- 122		4	1.08
123- 139		20	5.38
140- 156		200	53.76
157- 173		134	36.02
174- 190		14	3.76
Total		**372**	**100**
Mean		155.07 Centimetres	
Std. Deviation		10.716 Centimetres	
Weight in kilograms		**f**	**%**
35-' 49		29	7.80
50- 63		179	48.12
64- 77		124	33.33
78- 91		35	9.41
92- 105		5	1.34
Total		**372**	**100**
Mean		62.92 Kilograms	
Std. Deviation		10.82 Kilograms	
Body Mass Index (BMI)		**f**	**%**
<18.5	Underweight	7	1.88
18.5 - 24.9	Normal Weight	158	42.47
25.0 – 29.9	Overweight	143	38.44
30.0 – 34.9	Class1 Obesity	45	12.10
35.0 – 39.9	Class2 Obesity	12	3.23
>40.0	Class3 Obesity	7	1.88
Total		**372**	**100**

Plate 14: Recording Weight Of The Respondents with Weighing Scale

4.3B.2. Anthropometric data of Selected Respondents

The study of the people in terms of their physical body dimensions is called anthropometry. The anthropometric data is used for designing equipments, workplace, layout, personnel selection in sports, defense services etc. Anthropometric Measurements includes measurement of various human body characteristics such as size, breadth, circumferences and distance between anatomical points (Chauhan, **2015**). The researcher had taken measurements of 60 Municipal Primary School Teachers only. During pandemic (COVID-19) only Selected Municipal Primary School Teachers had given consent to take their Anthropometric measurements.

- The mean Eye Height of the respondents was measured as 57.2inches.
- The mean Shoulder Height of the respondents was measured as 52.57inches.
- The mean Acromion Height of the respondents was logged as 49.83inches.
- The mean Mid Patella Height of the respondents was measured as 18.2inches.
- The mean Elbow Rest Height of the respondents was recorded as 26.07inches.
- The mean Sitting Knee Height of the respondents was logged as 19.1inches.
- The mean Popliteal Height of the respondents was recorded as 15.88inches.
- The mean vertical reach of the respondents was measured as 75.40 inches.
- The mean horizontal reach of the respondents was logged as 60.55 inches.

Table 47: Distribution of Respondents according to their Anthropometric Measurements

(n= 60)

Anthropometric Data of the Respondents	**Respondents**	
Eye Height	**f**	**%**
45" - 51"	6	10
52" - 57"	20	33.33
58" - 63"	34	56.67
Mean	**57.2Inches**	
Shoulder Height	**f**	**%**
41" - 47"	6	10
48" - 53"	35	58.33
54" - 58"	19	31.67
Mean	**52.57Inches**	
Acromion Height	**f**	**%**
39" - 44"	4	6.67
45" - 49"	12	20.00
50" - 55"	44	73.33
Mean	**49.83Inches**	
Mid Patella Height	**f**	**%**
13" - 15"	4	6.67
16" - 18"	29	48.33
19" - 21"	27	45.00
Mean	**18.2Inches**	
Elbow Rest Height	**f**	**%**
21"- 23"	5	8.33
24"- 26"	27	45.00
27"- 29"	28	46.67
Mean	**26.07 Inches**	
Sitting Knee Height	**f**	**%**
18"	19	31.67
19"	23	38.33
20"	11	18.33
Mean	**19.1Inches**	
Popliteal Height	**f**	**%**
14" - 15"	16	26.67
16" - 17"	37	61.67
18"	7	11.67
Mean	**15.88Inches**	
Horizontal Reach	**f**	**%**
46”– 54”	9	15
55”– 62”	31	51.67
63”– 69”	20	33.33
Mean	**60.55 Inches**	
Vertical Reach	**f**	**%**
64”– 70”	8	13.33
71”– 77”	27	45.00
78”– 84”	25	41.67
Mean	**75.40 Inches**	

SECTION 4.4: Psychosocial Factors Induced Musculoskeletal Pain among the Municipal Primary School Teachers

This section helped in understanding the psychosocial factors induced musculoskeletal pain among the municipal primary school teachers. The psychosocial factors included their stress, job satisfaction and social support at the work place, at home and in general. However, the musculoskeletal pain symptoms included the pain, discomfort and inability to perform the tasks.

4.4.1. Psychosocial Factors induced Musculoskeletal Pain among the respondents

The table 48was showing the data regarding psychosocial factors induced musculoskeletal pain among the teachers. And was evaluated on psychosocial factors related to musculoskeletal pain in general (most of the times), at teacher's home and at the workplace (school)**.** The result sexhibited that the teachers were facing psychological issues that affected their work. The data further showed that 38.20 per cent of the teachers felt too much workload in general. It was also found that the teachers (27.42%, 23.66%) often felt tensed and felt frustrated. However, it was also found that 20.97 per cent of them felt nervous most of the time. These findings indicate the psychological stress that the selected teachers were undergoing in their routine life.

Along with this, it was also found that 23.12 percent of them most of the time felt tired when wake up in the morning. Further, it also revealed 16.67% felt that the circumstances of the personal life adversely affected their work life and few of them (10.48%) also tend to carry personal problems from home to their workplaces that might affect their work performances. Hence, it can be understood from the above mentioned findings that overall the selected teachers might be facing psychological issues (Herma 2006) and it also somehow affecting their work performances. Therefore it is important to provide a

positive work climate for the teachers in order to reduce their psychological burden. (Jeona, Buettnerb, and Granta, 2017)

The data also indicated that the variety of work that the teachers might be doing at their workplace. The duties of a teacher cannot be restricted to the teaching but also includes the duties related to the examination, supervision, counseling, programme coordinator, administration and so on. However, the teachers from the government schools are also assigned the duties out of their schools. They are being appointed regularly in vaccination programme, elections and civil examinations. Nowadays, due to their duties for household surveys during the pandemic they are considered as the COVID-19 frontline workers by the government. The teachers were being over burdened with the variety of tasks in order to keep the school in top lists. Therefore, it would not be wrong to say that the teachers have to perform extra work apart from teaching at their school. After school hours they have to fulfill their household responsibilities too. Thus, it creates a chaos within the individual to stay calm and healthy.

Moreover, the findings also supported that more than half of the teachers felt that they had too much workload at the school (54.57%) and they had to replace their often in the school (53.23%). The overburden of such tasks made them (49.19%) feel the shortage of teaching staff at the school. The present data indicates that the teachers felt tired when they wake up in the morning (table 49). This result was also supported by a research conducted by Herma in 2006, who also found a correlation between insufficient or poor sleep with extensive working hours, stress at workplace and cardiovascular diseases. This may be an indicator for their disturbed psychological as well physical health. However, nearly half of them agreed that their work involved repeated tasks (49.19%) at the school all day long. This is obvious as their tasks may have been repeating over the year with every new batch of student in their class and these repetitive tasks can led to musculoskeletal pain.

The findings indicated that more than one third of the teachers (35.75%) agreed that some circumstances in the school adversely affects their personal life whereas, 29.03 per cent of them agreed that they often felt annoyed by others at the school, carry problems of work place to their home (27.15%), and felt exhausted by work at school (26.34%).These feelings may build negative emotions like anger, ego, depression, frustration among them leading to their psychological illness. The table 43 also showed that 18.01 percent of them felt frustrated due to the job at the school. Depression and other psychological disorders could be reason for musculoskeletal pain and other disorders among the teachers. (Ming Ng, Voo and Maakip 2019; Zamri, Moy, & Hoe 2017)The weighted mean scores revealed that the respondents were having too much workload in general, at their work place (school) and they were feeling tensed most of the times. The teachers were also feeling tired when they wake up in the morning was one of the psychological factors induced musculoskeletal pain at their home. The weighted mean scores also reflected that the teachers had to replace colleagues in the school often, shortage of teaching staff in the school and work involving repeated task could be the reasons for psychological factors related to musculoskeletal pain at the work place.

Table 48: Psychological Factors induced musculoskeletal pain felt by the Teachers at their School (Work Place)

(n= 372)

Sr. No.	Psychological Factors induced musculoskeletal pain	Felt		Not Felt		Weighted mean scores out of 2
		f	%	f	%	
	In general(most of the times)					
1)	Do you often feel tensed? +	102 (0.55)	27.42	270 (0.73)	72.58	1.27
2)	Do you feel nervous? +	78 (0.42)	20.97	294 (0.79)	79.03	1.21
3)	Do you feel frustrated? +	88 (0.47)	23.66	284 (0.76)	76.34	1.24
4)	Do you feel you have too much workload? +	142 (0.76)	38.17	230 (0.62)	61.83	**1.38**

					Total	**1.27**
	At your Home					
5)	Do you feel tired when you wake up in the morning? +	86 (0.46)	23.12	286 (0.77)	76.88	**1.23**
6)	Do you regularly feel tired when getting up in the morning? +	69 (0.37)	18.55	303 (0.81)	81.45	1.19
7)	Are there circumstances in your private live that adversely affect your School work? +	62 (0.33)	16.67	310 (0.83)	83.33	1.17
8)	Do you take problems of home with you to your school work?+	39 (0.21)	10.48	333 (0.90)	89.52	1.10
					Total	**1.17**
	At the Workplace (School)					
9)	Does the principal appreciate your work in your school in front of the colleagues? -	341 (0.91)	91.67	31 (0.16)	8.33	1.07
10)	Do you have enough training to perform tasks at your school? -	332 (0.89)	89.25	40 (0.21)	10.75	1.10
11)	Does the supervisor provide enough support in your work? -	332 (0.89)	89.25	40 (0.21)	10.75	1.10
12)	Do you mostly enjoy you**r** work at the school? -	331 (0.88)	88.98	41 (0.22)	11.02	1.10
13)	Does the principal have a correct picture of you in your school? -	328 (0.88)	88.17	44 (0.23)	11.83	1.11
14)	Are you kept informed on what is going on in your school? -	326 (0.87)	87.63	46 (0.24)	12.37	1.11
15)	Do you find the atmosphere in the school all right? -	325 (0.87)	87.37	47 (0.25)	12.63	1.12
16)	Is your work in school interesting? -	312 (0.83)	83.87	60 (0.32)	16.13	1.15
17)	Does your colleague appreciate your work in your school in front of the other colleagues? -	312 (0.83)	83.87	60 (0.32)	16.13	1.15
18)	Do you have variety of work in your School work? -	308 (0.82)	82.80	64 (0.34)	17.20	1.16
19)	Do you get sufficient break-time? -	299 (0.80)	80.38	73 (0.39)	19.62	1.19
20)	Is your supervisor cooperative and supportive? -	295 (0.79)	79.30	77 (0.41)	20.70	1.20
21)	Do you feel that you are sufficiently valued in this school? -	297 (0.79)	79.84	75 (0.40)	20.16	1.19
22)	Do you think you are being paid is appropriate for the work you are doing at the school? -	291 (0.78)	78.23	81 (0.43)	21.77	1.21
23)	Can you take a holiday when you wish? -	267 (0.71)	71.77	105 (0.56)	28.23	1.27
24)	Can you count upon the support of your colleagues if	263 (0.70)	70.70	109 (0.58)	29.30	1.28

	necessary? -					
25)	Do your tasks vary according to the season or time of the Year? -	247 (0.66)	66.40	125 (0.67)	33.60	1.33
26)	Do you supervise other people in your daily work at your school? -	238 (0.63)	63.98	134 (0.72)	36.02	1.35
27)	Does your work vary from day to day basis? -	232 (0.62)	62.37	140 (0.75)	37.63	1.37
28)	Does the work rotate between you and your colleague? -	233 (0.62)	62.63	139 (0.74)	37.37	1.36
29)	Do you think that you have too much to do at your School? +	203 (1.09)	54.57	169 (0.45)	45.43	**1.55**
30)	Do you have to replace colleagues often in your school? +	198 (1.06)	53.23	174 (0.47)	46.77	**1.53**
31)	Is there a shortage of teaching staff at your school? +	183 (0.98)	49.19	189 (0.51)	50.81	**1.49**
32)	Does your work involve repeated task? +	183 (0.98)	49.19	189 (0.51)	50.81	**1.49**
33)	Do you consider your school work too simple? +	165 (0.89)	44.35	207 (0.56)	55.65	1.44
34)	Do you have a sedentary job? +	143 (0.77)	38.44	229 (0.62)	61.56	1.38
35)	Do you carry out same work (activity) the whole day? +	142 (0.76)	38.17	230 (0.62)	61.83	1.38
36)	Are there circumstances in your school that adversely affect your Private live? +	133 (0.72)	35.75	239 (0.64)	64.25	1.36
37)	Are you often annoyed by others at your School? +	108 (0.58)	29.03	264 (0.71)	70.97	1.29
38)	Do you take problems at school work with you to your home? +	101 (0.54)	27.15	271 (0.73)	72.85	1.27
39)	Are you frustrated by your job at the school? +	98 (0.53)	26.34	274 (0.74)	73.66	1.26
40)	Do you feel exhausted by your work at School? +	67 (0.36)	18.01	305 (0.82)	81.99	1.18
					Total	**1.23**

4.4.3. Psychosocial Factors induced Musculoskeletal Pain experienced by the respondents

A scale on psychosocial factors induced the musculoskeletal pain among the municipal primary school teachers was developed by the researcher. The Complete scale had 40 statements. The scale had 40 items on which the respondents were asked to rate each on Felt (Agree) and Not Felt (Disagree) response. The final score were arrived at by summating the score of each respondent on each statement. The

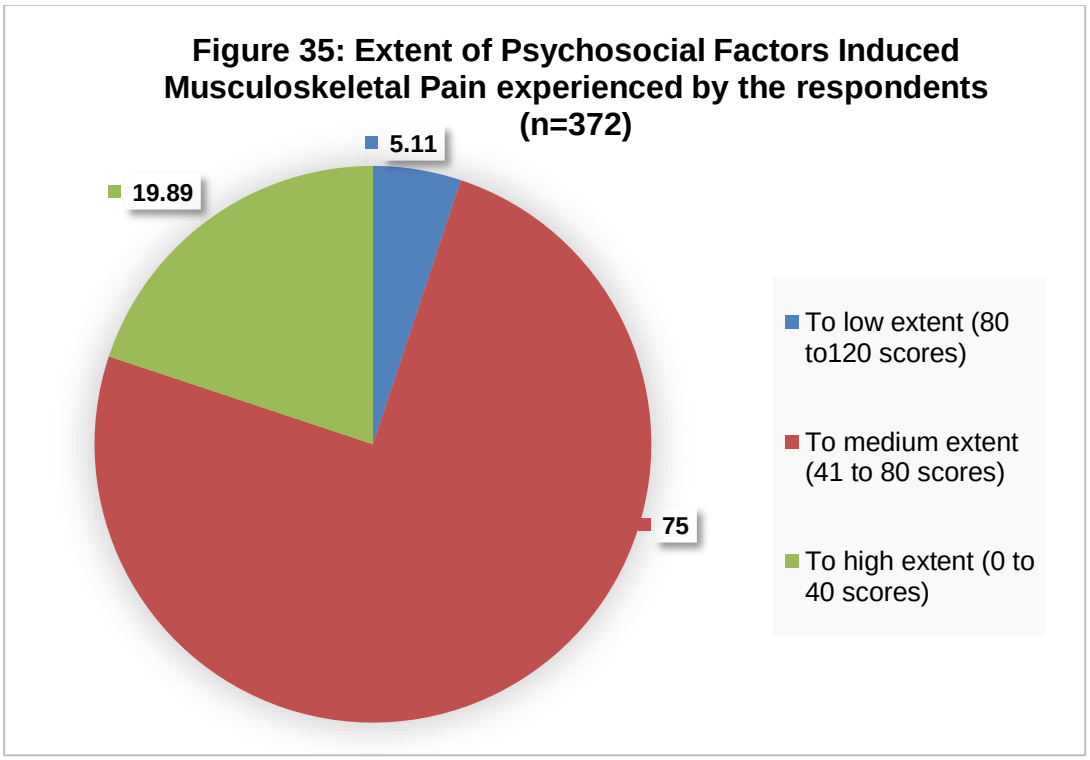
greater the score between 81 to 120 scores will indicate that the respondent was having lower Psychosocial Factors induced Musculoskeletal Pain, Moderate score between 41 to 80 scores will indicate that the respondent was having Psychosocial Factors induced Musculoskeletal Pain at medium level and the lower the score around between 0 (Zero) to 40 scores will indicate that the respondent was having higher Psychosocial Factors induced Musculoskeletal Pain.

A probe on psychosocial factors induced musculoskeletal pain among the respondents highlighted that 19.9 per cent of the respondents reported psychosocial factors induced Musculoskeletal Pain to the high extent (Table 50 and Figure 35).whereas, majority of the respondents (75.0 %) were found to have reported psychosocial factors induced Musculoskeletal Pain to medium extent. The findings indicated the psychological stress that the selected respondents were undergoing in their routine life. Hence, it can be understood from the below mentioned findings that the respondents were facing psychosocial factors induced musculoskeletal pain and it also somehow affecting their work performance in the school. The findings were also supported by other researches stating that, a psychological disorder affects the musculoskeletal skeletal disorders among teachers. (Ming Ng, Voo and Maakip 2019; Zamri, Moy, & Hoe 2017)Thus, an overview of the findings indicated that the respondents were affected by psychosocial factors induced musculoskeletal pain. Therefore an intervention programme was design to provide way and methods to psychosocial factors related to musculoskeletal pain.

Table 49: Extend of Psychosocial Factors Induced Musculoskeletal Pain experienced by the respondents

(n=372)

Extend of Psychosocial Factors Related to Musculoskeletal Pain experienced by the respondents	f	%
To low extent (80 to120 scores)	19	5.11
Tomedium extent (41 to 80 scores)	279	75.00
To high extent (0 to 40 scores)	74	19.89



SECTION4.5: Musculoskeletal Pain Experienced by the Municipal Primary School Teachers

The findings pertinent to perceived musculoskeletal pain of the municipal primary school teachers were reported in this section. The subjective data regarding the perceived pain of the respondents in the body parts namely neck, shoulders, arms, elbows, wrists, back, hips, thighs, legs, knees, feet and ankles while making movements in performing their task of teaching in classroom, doing daily checking and during rest time in recess were also presented in this section. An enquiry was also made whether the musculoskeletal pain was the cause of availing leave or not. The section also highlighted the status of their cure from musculoskeletal pain. An additional probe of inquiry was further done to know whether the respondents were suffering from any known identified problems or not while teaching in municipal primary school at the time of data collection.

This section also includes the findings related to the musculoskeletal pain that the respondents were experiencing due to their teaching profession. The pain in body muscles, ligaments and tendons, and bones are commonly termed as musculoskeletal pain (Der Sarkissian, 2021). The section throws light upon the type of musculoskeletal pain that the respondents were experiencing mainly due to their profession.

4.5.1. Musculoskeletal Pain experienced by the respondents in past 12 months

Of the total number of 372 respondents only 291 respondents reported to experience musculoskeletal pain in either part of their body (Table44). The data of the same number of the respondents only presented in this section.

A probe was made to find out the musculoskeletal pain experienced by the respondents in past 12 months(Table 51). Out of 372 respondents 291respondents were experiencing musculoskeletal pain in past one

year. The researcher had collected data on 5 point continuum likert scale with responses “Never”, “Rarely”, “Occasionally”, “Often” and “Very Often” scored 1 to 5 respectively.

Table 50: Musculoskeletal Pain experienced by the respondents in past 12 months

(n=291)

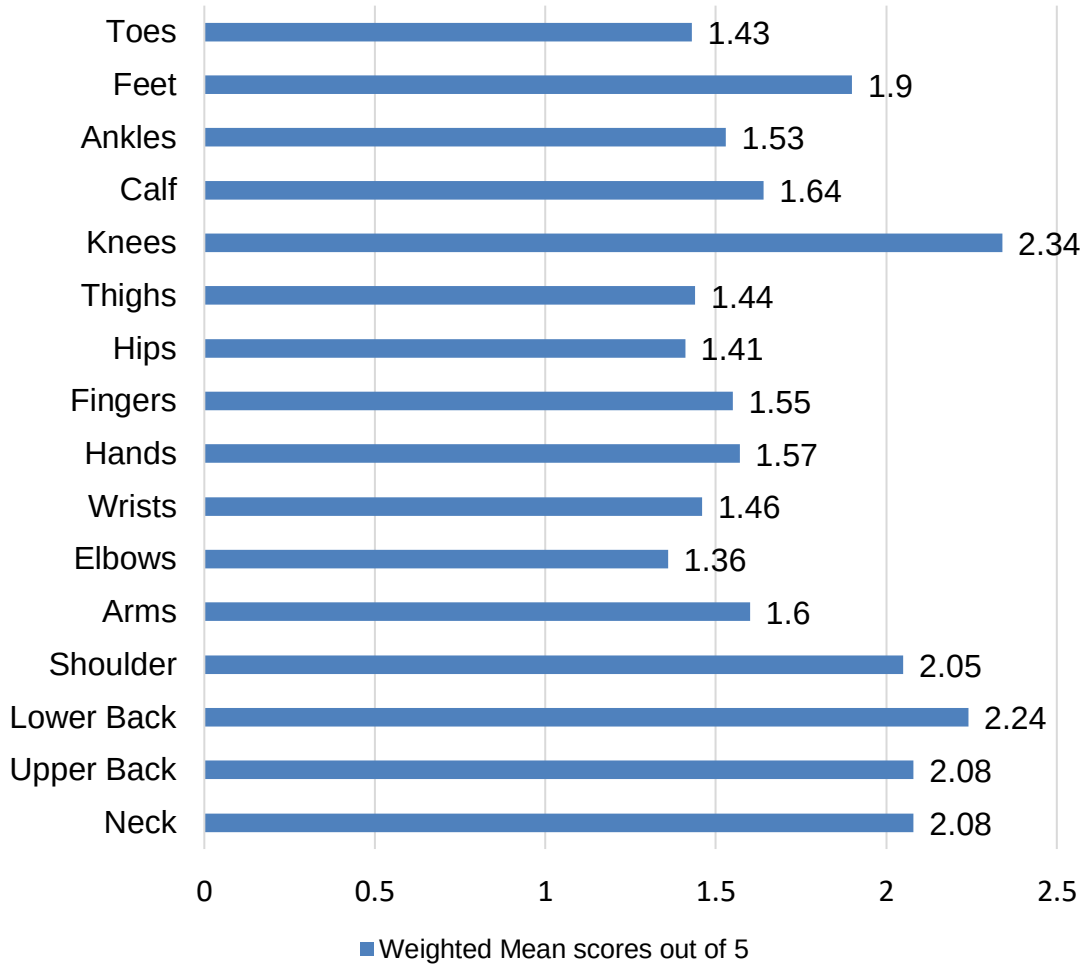
Body Parts	Very Often		Often		Occasionally		Rarely		Never		Weighted Mean scores out of 5
	f	%	f	%	f	%	f	%	f	%	
Neck	14	4.80	22	7.60	61	21.00	69	23.70	125	43.00	**2.08**
Upper Back	12	4.10	21	7.20	71	24.40	60	20.60	127	43.60	**2.08**
Lower Back	19	6.50	26	8.90	79	27.10	49	16.80	118	40.50	**2.24**
Shoulder	11	3.80	20	6.90	71	24.40	61	21.00	128	44.00	2.05
Arms	2	0.70	12	4.10	38	13.10	56	19.20	183	62.90	1.60
Elbows	3	1.00	3	1.00	29	10.00	25	8.60	231	79.40	1.36
Wrists	4	1.40	5	1.70	32	11.00	39	13.40	211	72.50	1.46
Hands	4	1.40	10	3.40	36	12.40	48	16.50	193	66.30	1.57
Fingers	4	1.40	7	2.40	41	14.10	41	14.10	198	68.00	1.55
Hips	6	2.10	5	1.70	29	10.00	22	7.60	229	78.70	1.41
Thighs	6	2.10	5	1.70	31	10.70	27	9.30	222	76.30	1.44
Knees	23	7.90	35	12.00	67	23.00	59	20.30	107	36.80	**2.34**
Calf	4	1.40	16	5.50	39	13.40	45	15.50	187	64.30	1.64
Ankles	4	1.40	13	4.50	31	10.70	36	12.40	207	71.10	1.53
Feet	8	2.70	21	7.20	52	17.90	64	22.00	146	50.20	1.90
Toes	6	2.10	8	2.70	27	9.30	23	7.90	227	78.00	1.43

Note: Multiple Responses.

The data in table 51 and Figure 36 clearly states that the musculoskeletal pain in knees was found to be most prominent one as experienced by the respondents. While comparing the findings of the weighted mean scores it was revealed that knees and lower back pain was found to be most prevalent musculoskeletal pain as perceived by the respondents followed by upper back pain, neck pain and shoulder pain in past 12 months. Body parts like elbow, hips and toes were the ones where the least musculoskeletal pain was experienced by the respondents. As the finding indicated that teachers were mainly experiencing pain in their knees, neck, back and shoulders, such pain usually occur due to having the bad postures for longer duration and sitting or standing in one position for a long period. Teaching for long

hours forces one to stand for longer duration so as to remain audible and visible to the whole class. This situation might be one of the causes for musculoskeletal pain in these body parts of the teachersin past 12 months.

Figure 36: Musculoskeletal Pain experienced by the respondents in past 12 months (n=291)



The Findings of the present study are similar to a research conducted by**Abdulmonemet.al** (2014) where in the researcher found that the female teachers suffered the musculoskeletal pain related to back, knees, heels, shoulder and neck. There existed a positive association of musculoskeletal pain with Body Mass Index (BMI), Vitamin D deficiency, level of teaching and co existence of any chronic disease. A latest study by **Alias et.al** (2020) on female teachers in Terengganu's Primary School in Malaysia found a significant prevalence of

musculoskeletal disorders. The most affected body parts were feet, followed by knee, upper back, and lower back. Related risk factors such as age, BMI, sports activity, type of shoe, teaching hours and standing hours were analysed. Another similar study conducted by **Solis-Soto et.al.** (2017) also found the prevalence of MSD in most of the teachers in past one year. The neck pain was found to be the most common and the least common musculoskeletal disorders was the wrist pain and hand pain. These results were similar with the present research conducted in selected two cities of Gujarat State of India by the researcher.

4.5.2. Radiating Back Pain towards the legs experienced by respondents in past 12 months

The information regarding the radiating back pain experienced or not by the respondents in past 12 months towards the legs was inquired by the researcher (Table 52).The findings indicates that291 of those respondents who experienced radiating pain towards legs, it was found that 30.60% of the respondents experienced radiating back pain towards their right knee in past twelve months whereas; 26.50%experienced the same towards their left knee. Furthermore, it was also found that some of them experienced radiating back pain towards their right ankle (12.40%), left ankle (12.70%), right foot (15.50%), and left foot (15.80%) respectively. Although, very few of them (7.90% and 9.60%) experienced the same in their right foot toes and left foot toes. However, majority of the respondents did not experience radiating back pain towards their legs.

It was also observed by the researcher that some of the teachers were suffering from radiating pain in ankle, foot and toes. For relieving pain they were putting their legs on chair seat to get some relief during teaching in the class. Some of the teachers even told the researcher that for relieving pain they soaked their legs in hot water filled in bucket for ten to fifteen minutes daily at home. Some of the teachers used to apply ointments on affected areas where they were suffering from pain and discomfort. The respondents were not feeling confident about

sharing their health details with the researcher and with their fellow co-workers. Often they were using home remedies for overcoming the pain and often they did not prefer to visit the doctors for the same.

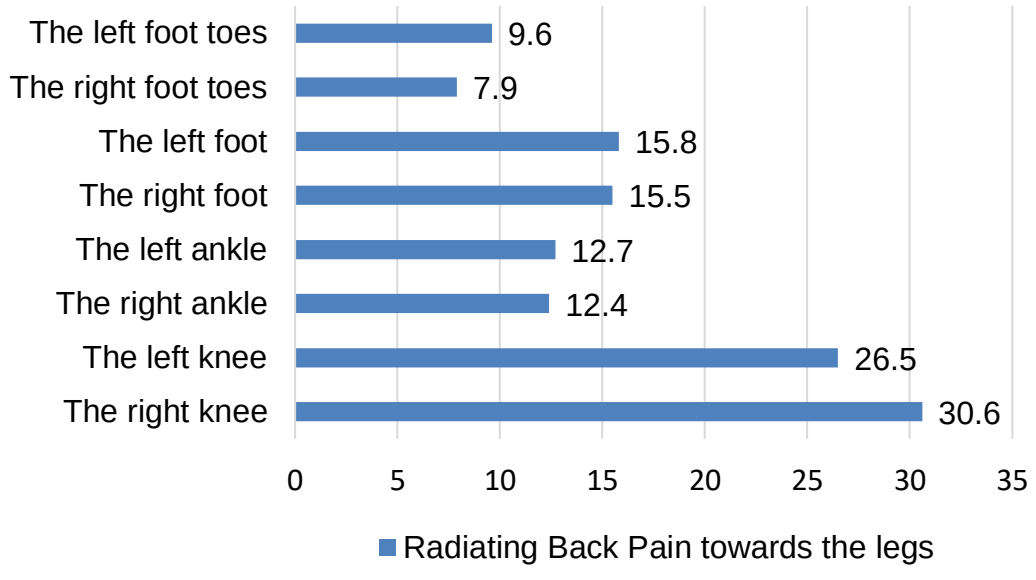
Table 51: Radiating Back Pain towards the legs as experienced by the respondents in past 12 months

(n=291)

Radiating Back Pain towards the legs	Experienced		Not Experienced	
	f	%	f	%
The right knee	89	30.60	202	69.40
The left knee	77	26.50	214	73.50
The right ankle	36	12.40	255	87.60
The left ankle	37	12.70	254	87.30
The right foot	45	15.50	246	84.50
The left foot	46	15.80	245	84.20
The right foot toes	23	7.90	268	92.10
The left foot toes	28	9.60	263	90.40

Note: Multiple Responses.

Figure 37: Radiating Back Pain towards the legs as experienced by the respondents in past 12 months (n=291)



The findings highlighted that among those respondents who experienced radiating back pain towards their legs was mainly towards their knees. The pain in knees causes problems while bending knees,

sitting, standing, squatting and walking. A teacher needs to sit, stand and walk during the classroom teaching sessions. Therefore, it would not be wrong to say that the respondents might be facing troubles in teaching due to their radiating back pain towards their legs.

4.5.3. Radiating Neck and Shoulder Pain till the Arms as experienced by respondents in past 12 months

The radiating neck and shoulder pain till the areas as experienced by the respondents was also inquired (Table 53 and Figure 38).The findings related to the radiating neck and shoulder pain till the arms as experienced by the respondents in past 12 months showed that some of them experienced the same in their right upper arms (14.10%), left upper arm (12.70%) and in right palm (11.30%). Moreover, the table 43 also revealed that very few of them also experienced the radiating pain till their right elbow (8.20%), left elbow (6.90%), right forearm (8.20%), left forearm (6.50%), left wrist (8.20%), left palm (8.60%) and right fingers (9.60%) and left fingers (9.30%).

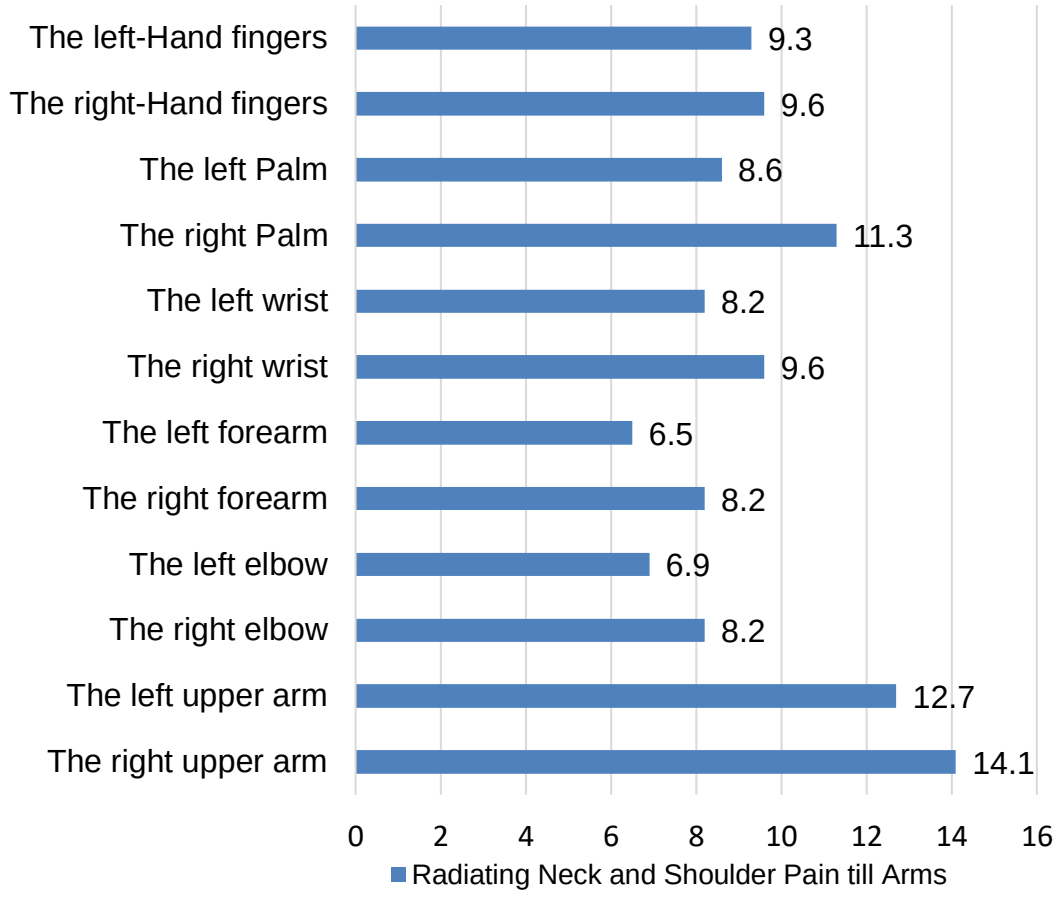
Table 52: Radiating Neck and Shoulder Pain till the Arms as experienced by respondents in past 12 months

(n=291)

Radiating Neck and Shoulder Pain till Arms	Experienced		Not Experienced	
	f	%	f	%
The right upper arm	41	14.10	250	85.90
The left upper arm	37	12.70	254	87.30
The right elbow	24	8.20	267	91.80
The left elbow	20	6.90	271	93.10
The right forearm	24	8.20	267	91.80
The left forearm	19	6.50	272	93.50
The right wrist	28	9.60	263	90.40
The left wrist	24	8.20	267	91.80
The right Palm	33	11.30	258	88.70
The left Palm	25	8.60	266	91.40
The right-Hand fingers	28	9.60	263	90.40
The left-Hand fingers	27	9.30	264	90.70

Note: Multiple Responses.

Figure 38: Radiating Neck and Shoulder Pain till the Arms as experienced by respondents in past 12 months (n=291)



Majority of the respondents did not experience radiating neck and shoulder pain till arms in the last 12 months. The left elbow and the left forearm were least affected by musculoskeletal pain by the respondents. It can be inferred from this finding that a very few of the respondents were experiencing the radiating neck and shoulder pain till their arms. The reason could be that the respondents used blackboards and white boards while teaching and need to check the assignments, notebooks and answer sheets of the students that involved the movement of arms. The constant engagement of arms may induce neck and shoulder pain that may radiate till their arms.

4.5.4. Problems faced by the respondents due to Musculoskeletal Pain while performing various activities

A probe was conducted to find out the problems faced by the respondents due to musculoskeletal pain while performing various activities. The researcher had collected data on 5 point continuum of responses “Never”, “Rarely”, “Occasionally”, “Often” and “Very Often” which were scored 1 to 5 respectively.

Table 53: Problems faced by the respondents due to Musculoskeletal pain while performing various activities

(n=291)

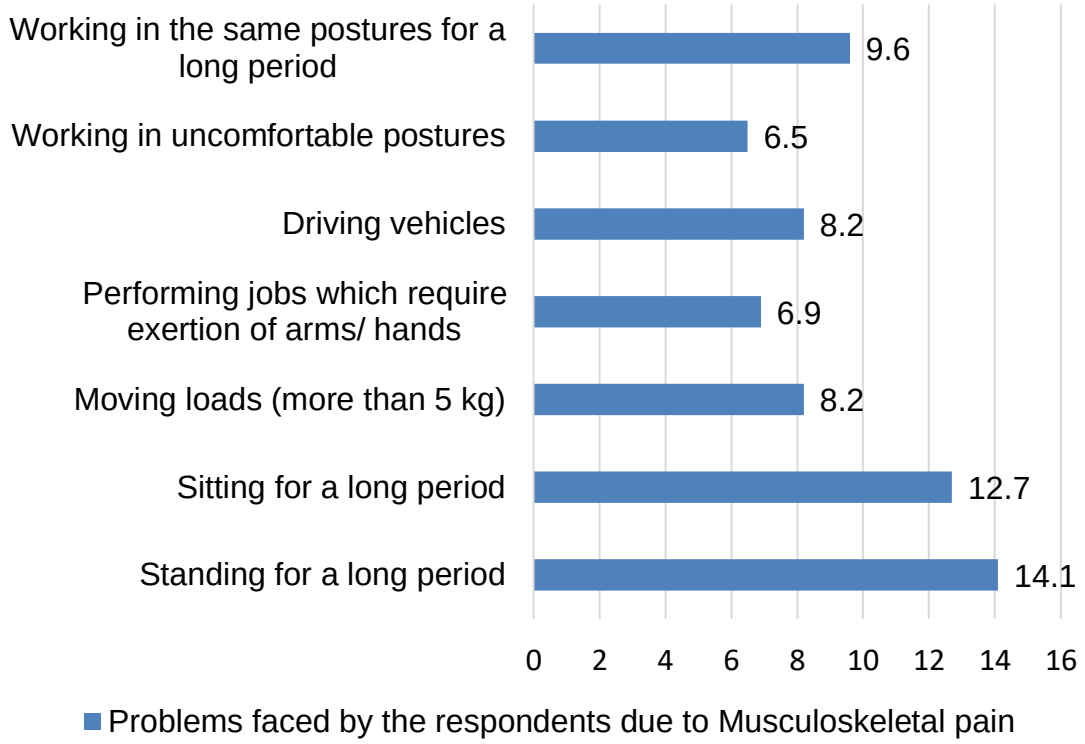
Activities	Very Often		Often		Occasionally		Rarely		Never		Weighted mean scores out of 5
	f	%	f	%	f	%	f	%	f	%	
Standing for a long period	27	9.30	34	11.70	80	27.50	49	16.80	101	34.70	**2.44**
Sitting for a long period	22	7.60	40	13.70	77	26.50	45	15.50	107	36.80	**2.40**
Moving loads (more than 5 kg)	15	5.20	20	6.90	54	18.60	53	18.20	149	51.20	1.97
Performing jobs which require exertion of arms/ hands	11	3.80	26	8.90	47	16.20	39	13.40	168	57.70	1.88
Driving vehicles	7	2.40	11	3.80	35	12.00	33	11.30	205	70.40	1.56
Working in uncomfortable postures	15	5.20	28	9.60	64	22.00	44	15.10	140	48.10	**2.09**
Working in the same postures for a long period	26	8.90	35	12.00	67	23.00	51	17.50	112	38.50	**2.35**

Note: Multiple Responses.

The finding in table 50 and 52 clearly elicited the respondents were suffering from radiating pain in their back, arms, shoulders and knees. Table 54 and Figure 39 showed the findings related to the problems faced by teachers due to musculoskeletal pain while performing

various activities. Standing for a long period was found to be most problematic activity to be performed in general as opined by the respondents followed by sitting for a long period and working in the same postures for a long period.

Figure 39: Problems faced by the respondents due to Musculoskeletal pain while performing various activities (n=291)



Similar trend was also found consistent with a study among teaching staff in a Nigerian Teachingin Referral Hospital (Ganiyu, S., et. al.,2015). It was found that, the staff who taught while standing was the one who was10 times more likely to develop lower back trouble. Ebtesam, M.S. (2015) who researched on, "Work- related musculoskeletal pain among primary school teachers: a recommended health promotion intervention for prevention and management." found a link between MSD prevalence and job duration (p<0.01) among teachers in Egypt. Eggers, et. al.(2018) also found out that prolonged standing was associated with increase in prevalence of musculoskeletal disorders (p<0.01

4.5.5. Sick leave taken due to musculoskeletal pain experienced by the respondents during the past 12 months

The present findings indicated that the respondents experienced musculoskeletal pain in their body parts in past twelve months. These kinds of pain caused problems in performing various activities by them at their workplace and at home. The ignorance towards these musculoskeletal pains may cause severe issues. Therefore, in some cases people had taken leaves and opted for complete rest to cure musculoskeletal pains. Table 55 shows the data regarding the sick leaves taken by the respondents due to the musculoskeletal pain experienced by them during the past 12 months. It indicated that the teachers have taken leaves a duration on one day to three days or months.

Table 55: Sick leave taken due to musculoskeletal pain experienced by the respondents during the past 12 months

(n=291)

Musculoskeletal pain in Various Body Parts	Duration of Sick leave taken									
	1-10 days		11-20 days		21-30 days		2 months		3 & more months	
	f	%	f	%	f	%	f	%	f	%
Neck	11	3.78	3	1.03	2	0.69	2	0.69	-	0.00
Upper Back	11	3.78	1	0.34	2	0.69	3	1.03	4	1.37
Lower Back	13	4.47	2	0.69	1	0.34	-	-	-	0.00
Shoulders	4	1.37	1	0.34	-	-	-	-	2	0.69
Arms	2	0.69	-	-	-	-	1	0.34	2	0.69
Wrists	-	-	-	-	-	-	-	-	2	0.69
Hands	-	-	-	-	-	-	1	0.34	1	0.34
Fingers	2	0.69	1	0.34	-	-	-	-	-	-
Hips	-	-	-	-	-	-	-	-	1	0.34
Thighs	-	-	-	-	-	-	-	-	-	-
Knees	10	3.44	1	0.34	1	0.34	1	0.34	1	0.34
Calf	1	0.34	-	0.00	1	0.34	-	-	-	-
Ankles	2	0.69	-	0.00	1	0.34	-	-	-	-
Feet	-	-	1	0.34	-	-	-	-	-	-
Toe	2	0.69	-	-	-	-	-	-	-	-
No Leave Taken	233	80.07	281	96.56	283	97.25	283	97.25	278	95.53
Total	291	100	291	100	291	100	291	100	291	100

Note: Multiple Responses.

Although, the figures are small but it indicates the severity of the

problems caused by the musculoskeletal pain that the respondents had to take leaves for several months. The findings reported that mostly the respondents had taken leaves for 1 -10 days due the musculoskeletal pain in their neck (3.78%), upper back (3.78%), lower back (4.47%) and knees (3.44%). Moreover, the table 48 also indicated that overall the respondents had taken leaves for 1-10 days (19.97%), 11-20 days (3.42%), 21- 30 days (2.74%), 2 months (2.74%), and three or more months (4.46%) due to their musculoskeletal pain in various body parts. Among them higher percentage of the leaves were taken due to the pain in neck, back and knees.

4.5.6. Duration of Musculoskeletal Pain experienced by the respondents

Table 56 highlights the data regarding the details about the musculoskeletal pain among the respondents. It shows that very few of them agreed that musculoskeletal pain cured completely within few days or week of its occurrence. However, some of them responded that musculoskeletal pain was not cured entirely and the symptoms sometimes reoccur viz. neck (7.60%), upper back (3.10%), lower back (13.10%), shoulders (6.90%), arms (2.40%), elbows (1.40%), wrists (2.10%), hands (4.50%), fingers (1.70%), hips (2.70%), thighs (3.40%), knees(14.40%), calf (2.10%), ankles(3.40%), feet(4.80%),toes (0.70%). were suffering from pain in their back, knees, arms and shoulders. Very few them had also agreed that their musculoskeletal pain did not cure completely and their symptoms also persisted. The data presented in table 50 indicates that most those respondents who were suffering with musculoskeletal pain from past one year agreed that it did not get cure and the symptoms started recently.

The data reflects the physical pain that the respondents were going through in their routine life. The musculoskeletal pain caused numerous problems (table 54) to the respondents. The routine activities at workplace and household level get affected by the prolonged musculoskeletal pain. Der Sarkissian, 2021 mentioned in a

review article that the musculoskeletal pain can cause entire body pain and their symptoms differ individually. The common symptoms could be twitch or burn sensation in muscles, pain, fatigue, disturbed sleep. The treatment of it includes consumption of medicines like steroids, pain killers, anti-inflammatory pills, exercises, physiotherapy, acupressure, relaxation techniques and many more based on the symptoms.

Table 55: Duration of Musculoskeletal Pain experienced by the respondents

(n=291)

Pain in Various Body Parts	Cured completely within a few days		Cured completely but it took a few weeks		Cured not entirely sometimes symptoms do reoccur		Not cured symptom persisted		Not cured but symptoms started only recently		Did not Experienced any pain	
	f	%	f	%	f	%	f	%	f	%	f	%
Neck	23	7.90	16	5.50	22	7.60	7	2.40	4	1.40	219	75.30
Upper Back	12	4.10	9	3.10	9	3.10	24	8.20	12	4.10	5	1.70
Lower Back	21	7.20	14	4.80	38	13.10	15	5.20	8	2.70	195	67.00
Shoulder	20	6.90	14	4.80	20	6.90	7	2.40	2	0.70	228	78.40
Arms	7	2.40	3	1.00	7	2.40	2	0.70	1	0.30	271	93.10
Elbows	3	1.00	4	1.40	4	1.40	1	0.30	-	-	279	95.90
Wrists	8	2.70	1	0.30	6	2.10	3	1.00	-	-	273	93.80
Hands	3	1.00	1	0.30	13	4.50	1	0.30	-	-	273	93.80
Fingers	8	2.70	-	-	5	1.70	1	0.30	-	-	277	95.20
Hips	3	1.00	2	0.70	8	2.70	2	0.70	-	-	276	94.80
Thighs	1	0.30	3	1.00	10	3.40	2	0.70	2	0.70	273	93.80
Knees	10	3.40	5	1.70	42	14.40	12	4.10	8	2.70	214	73.50
Calf	1	0.30	-	-	6	2.10	1	0.30	-	-	283	97.30
Ankles	2	0.70	1	0.30	10	3.40	2	0.70	3	1.00	273	93.80
Feet	4	1.40	-	-	14	4.80	3	1.00	-	-	270	92.80
Toe	-	-	5	1.70	2	0.70	-	-	-	-	284	97.60

Note: Multiple Responses.

4.5.8 Musculoskeletal Pain related health conditions experienced by the respondent.

The data regarding the musculoskeletal pain related health conditions among the respondents was presented in table 51. It reveals that among those who were experiencing musculoskeletal pain were suffering 19.00% from lower back pain and 13.00% from knee osteoarthritis. It was also noted that little less than ten percent of them were suffering from several health conditions viz. 9.00% of the respondents were suffering from Migraine and8.00%of the respondents were suffering fromFrozen shoulder. The 7.00% of the respondents were suffering fromVertigo, Mid Back Pain, Cervical Pain and Patelofemoral Pain Symptoms. The Upper Back Pain was affectively 6.00% and Painful Heel was affectively 5.00% of the respondents. The 4.00% of the respondents were experiencing Cervical Spondylosis, Shoulder Impingement Syndromeand Periformis Tightness. The musculoskeletal pain related health conditions namely Carpal Tunnel Syndrome and Tennis Elbow was affecting 3.00% of the respondents and Hamstrings Tightness, Golfer's Elbow, Calcaneal Spur and De Quervain's Tenosynovitis 2.00% of the respondents. The 1.00% of the respondents were suffering fromPlantar Fasciitis, Hip Osteoarthritis, Femoralacetabulum Impingement, Hallux Valgus, Supraspinatous, Biceps Tendinitis, Swan Neck Deformity, Boutonnière Deformity and Tendinitis.

These conditions are severe health conditions that affected the body movement and caused severe pain to the respondents. Darwish and Al-Zuhair (2013) also found the prevalence of musculoskeletal disorder among the respondents and found the correlation between the MSD and the age, weight and experience of teaching among teachers. Canterfor Disease Control and Prevention (2020) mentioned that Carpal tunnel syndrome (CTS), Back injury and back pain, Arthritis are most common work related musculoskeletal disorders. The further added that, these MSDs not only affected the employees but also bring high risk for employers as well, such as absenteeism, reduced productivity, increased health care expenses and many more.

Table 56: Musculoskeletal Pain related health conditions experienced by the respondents

(n=291)

Health conditions experienced by the respondents	**f**	**%**
Low Back Pain	71	19.00
Knee Osteoarthritis	50	13.00
Migraine	32	9.00
Frozen Shoulder	28	8.00
Vertigo	26	7.00
Mid Back Pain	25	7.00
Cervical Pain	27	7.00
Patelofemoral Pain Symptoms	27	7.00
Upper Back Pain	24	6.00
Painful Heel	19	5.00
Cervical Spondylosis	15	4.00
Shoulder Impingement Syndrome	16	4.00
Periformis Tightness	16	4.00
Carpal Tunnel Syndrome	11	3.00
Tennis Elbow	10	3.00
Golfer's Elbow	6	2.00
Hamstrings Tightness	6	2.00
Calcaneal Spur	9	2.00
De Quervain's Tenosynovitis	6	2.00
Plantar Fasciitis	8	2.00
Hip Osteoarthritis	5	1.00
Femoralacetabulum Impingement	2	1.00
Hallux Valgus	5	1.00
Supraspinatous	4	1.00
Biceps Tendinitis	3	1.00
Swan Neck Deformity	4	1.00
Boutonnière Deformity	4	1.00
Tendinitis	4	1.00
Experienced no health condition	219	59.00

Note: Multiple Responses**.**

SECTION 4.6: Testing of Hypotheses

The present section covered in detail the statistical analysis of the hypotheses of the research. The findings for the testing of hypotheses as per the nature of variables were computed in this section.

"ANOVA" was utilized to find out the variation between the musculoskeletal pain experienced by the respondents in past 12 months with their age and years of experience in teaching.Scheffe's test was utilized to find out the musculoskeletal pain experienced by the respondents in past 12 months with their years of experience in teaching. 't'- test was utilized to find out the mean difference between musculoskeletal pain experienced by the respondents during last 12 months with their gender. For the purpose of statistical analysis, the hypotheses were created in null form. As below:

Ho_1:There exists no variation in the Musculoskeletal pain experienced by the respondents in past 12 months with their personal variable (age, years of experience in teaching and Gender)

$Ho_{1.1}$: There exists no variation in the Musculoskeletal pain experienced by the respondents in past 12 months with their age.

$Ho_{1.2}$: There exists no variation in the Musculoskeletal pain experienced by the respondents in past 12 months with their years of experience in teaching.

$Ho_{1.3}$:There exists no difference in the Musculoskeletal pain experienced by the respondents in past 12 months with their gender.

To find out the variation in the Musculoskeletal pain experienced by the respondents in past 12 months with their Age, Years of experience in teaching and Gender “Analysis of variance” were computed to test this hypothesis.

Table 57: Analysis of Variance (ANOVA) showing variation in Musculoskeletal Pain experienced by the respondents in past 12 months with their age (in years) and years of experience.

Selected Variables	Sum of Squares	df	Mean Square	F-value	Level of Significance
Age (in years)					
Between Groups	338.288	3	112.763	1.045	N.S
Within Groups	30960.990	287	107.878		
Years of experience					
Between Groups	1334.881	3	444.960	4.262	0.01
Within Groups	29964.398	287	104.406		

df =Degree of Freedom N.S = Not Significant

Table 57 shows that there existed no significant variation in the musculoskeletal pain experienced by the teachers during past 12 months with their age. Therefore, the null hypothesis stating that there will be no significant variation in the musculoskeletal pain experienced by the respondents in past 12 months with their age was accepted. To conclude, the musculoskeletal pain experienced by the respondents in past 12 months did not vary with their age-groups.

The findings suggested that the teachers had experienced the musculoskeletal pain in past 12 months in variety of forms. However, the presence of musculoskeletal pain did not vary according to their age groups. The reason for this finding could be the type of work that teachers were doing at their schools and could also be their body posture. Although in contrast to the present finding, the significant association between the MSD and the age of teachers was found in

other studies carried out on female teachers of Asian countries. (Abdel-Salam et.al. 2019; Alias, Karuppiah, and Perumal, 2020)In contrast to this, Abdulmonemet. al. (2014) found no association between the musculoskeletal pain and years of experience among the female teachers of Saudi schools. However, they reported a significant association with other factors such as marital status and body mass index.

The ANOVA results for differences in musculoskeletal pain experienced by the teachers in past 12 months with their years of experience showed a significant variation. This means the musculoskeletal pain experienced by the teachers significantly varied according to their years of teaching experience. Hence, the null hypothesis stating that there will be no significant variation in the musculoskeletal pain experienced by the respondentsin past 12 months with their years of experience was rejected.

Table 58: Scheffe's test showing the mean difference between Musculoskeletal pain experienced by the respondents during last 12 months with their Years of experience in teaching.

Total teaching experience (in years)		Mean Difference (I-J)	Error	Level of Significance
(I)	(J)			
2-10 Years	11-20 Years	3.295	1.779	N.S
	21-30 Years	-.541	1.838	N.S
	31-38 Years	-2.252	1.935	N.S
11-20 Years	2-10 Years	-3.295	1.779	N.S
	21-30 Years	-3.836	1.538	N.S
	31-38 Years	-5.547	1.653	0.05
21-30 Years	2-10 Years	.541	1.838	N.S
	11-20 Years	3.836	1.538	N.S
	31-38 Years	-1.711	1.716	N.S
31-38 Years	2-10 Years	2.252	1.935	N.S
	11-20 Years	5.547	1.653	0.05
	21-30 Years	1.711	1.716	N.S

df= Degree of Freedom N.S=Not Significant

To find out further the variation in the Musculoskeletal Pain experienced by the respondents in past 12 months with the different categories of their Years of experience in teaching "Scheffe's test" was computed (Table 58). The mean difference in the musculoskeletal pain experienced by the respondents in past 12 months with the categories of their teaching experiences. It indicated that the respondents with the teaching experience of 31-38 years and 11-20 years differed significantly (at 0.05 level of significance) in the musculoskeletal pain experienced by the them in past 12 months from those of the other respondents having teaching experience of as per the range mentioned

in Table 58.However, no significant differences were found in the other groups.

Temesgen, (2019) found the prevalence of shoulder and neck pain among teachers and a significant association of this with years of teaching experience. Abdel-Salam (2019) also found the significant association between the MSD and years of teaching, daily working hours and number of classes. The present findings also indicates that overburden of work may increase the musculoskeletal pain among the respondents. The years of experience in single profession means that they were doing the same task daily since their first day of job and majority of them get only one break during their work hours (refer table 17). This could be tiring and might be stressful. Moreover, it might lead them towards having musculoskeletal pain in various body parts.

To find out the mean difference in the Musculoskeletal pain experienced by the respondents in past 12 months with the Gender of the respondent 't'-test was computed (Table 59).

Table 59: 't' value showing the mean difference in Musculoskeletal Pain experienced by the respondents in past 12 months with their Gender

Gender	n	Mean score	t-value	df	Level of Significance
Female	238	68.63	-1.125	290	N.S
Male	53	66.91	-1.096		

df= Degree of Freedom N.S=Not Significant

The findings reported that there was no significant difference in same according the gender of the respondents. Thus, the null hypothesis stating that there will be no significant differences in musculoskeletal pain experienced by the teachers in past 12 months in relation with their gender was accepted.

Thus conclusion can be drawn that the respondents did not differ in experiencing their musculoskeletal pain in past 12 months due to being

female or male. On the basis of mean scores it can be inferred that female respondents were more prone to experiencing musculoskeletal pain as compared to male respondents. Other similar study also reported the high prevalence of musculoskeletal disorder among female teachers in comparison to male teachers (Vaghela and Parekh, 2018).

Ho_2:There exists no relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their personal variables (Body Mass Index and Monthly Personal Income), family variables (Type of Family, Number of Family Members and Monthly Family Income), Psychosocial Factors among the respondents and the problems faced by the respondents while carrying out various activities.

$Ho_{2.1}$:There exists no relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Body Mass Index (BMI).

$Ho_{2.2}$:There exists no relationship between Musculoskeletal pain experienced by the respondents in past 12 months with their Monthly Personal Income (in Rs).

$Ho_{2.3}$:There exists no relationship between Musculoskeletal pain experienced by the respondents in past 12 months with their Monthly Family Income (in Rs).

$Ho_{2.4}$:There exists no relationship between Musculoskeletal pain experienced by the respondents in past 12 months with their Type of Family.

$Ho_{2.5}$:There exists no relationship between Musculoskeletal pain experienced by the respondents in past 12 months with their Number of Family Members.

$Ho_{2.6}$:There exists no relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their psychosocial factors among the respondents.

$Ho_{2.7}$:There exists no relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with the problems faced by them while carrying out various activities.

To examine the relationship between the musculoskeletal pain experienced by the respondents in past 12 months with their Body Mass Index (BMI) the Pearson Correlation was computed (Table 60).

Table 60: Correlation between the Musculoskeletal Pain among Teachers and their Body Mass Index (BMI)

Musculoskeletal Pain in Body Parts	Pearson Correlation	df	Level of Significance
Neck	0.076	290	N.S
Upper Back	0.030	290	N.S
Lower Back	-0.005	290	N.S
Shoulders	0.072	290	N.S
Arms	0.81	290	N.S
Elbows	0.062	290	N.S
Wrists	0.025	290	N.S
Hands	0.072	290	N.S
Fingers	0.101	290	N.S
Hips	0.086	290	N.S
Thighs	0,075	290	N.S
Knees	0.047	290	N.S
Calf	0.018	290	N.S
Ankles	0.014	290	N.S
Feet	0.059	290	N.S
Toes	0.070	290	N.S

The results for the correlation between musculoskeletal pain experienced by the respondents in past 12 months with their Body Mass Index (BMI) are presented in table 61. It showed there were no significant correlation existed between musculoskeletal pains

experienced by the respondents in past 12 months with their Body Mass Index (BMI). Hence the null hypothesis stating that there exist no significant correlation between musculoskeletal pain experienced by the teachers and their Body Mass Index (BMI) was accepted.

The data regarding the Body Mass Index of the respondents showed that higher percentage of the respondents had normal weight whereas, a little less than forty percent of them were overweight and few of them also suffering from Class 1,2,3 obesity (refer table 56). The higher BMI might affect the health status of the respondents and cause various lifestyle diseases. However, the present data showed no correlation among the musculoskeletal pains experienced by the teachers with their Body Mass Index (BMI).

In contrast to present finding, Kortt and Baldry (2002) found the significant relationship between the probability of suffering from musculoskeletal pain and the obesity among the adults age between 20 to 64 years. Abdulmonem et.al. (2014) also found a significant correlation between the Body Mass Index and the pain in heels among female school respondents. Darwish and Zuhair (2013) had similar findings. They also concluded that the musculoskeletal pain among government and private teachers had significant correlation with their gradual weight gain. Aldukhayel et.al. (2021) also highlighted similar findings in their study with respondents in Saudi Arabia.

The relationship between Musculoskeletal pain experienced by the respondents in past 12 months with their monthly personal income (in Rs.) was analysed using Pearson's Correlation (Table 61).

Table 61: Correlation showing the relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Monthly Personal Income (in Rs.).

Musculoskeletal Pain in Body Parts	Pearson Correlation	df	Level of Significance
Neck	-0.137	290	**0.05**
Upper Back	-0.045	290	N.S
Lower Back	-0.069	290	N.S
Shoulders	-0.067	290	N.S
Arms	-0.008	290	N.S
Elbows	-0.088	290	N.S
Wrists	-0.049	290	N.S
Hands	-0.017	290	N.S
Fingers	0.080	290	N.S
Hips	-0.101	290	N.S
Thighs	-0.097	290	N.S
Knees	-0.167	290	**0.01**
Calf	-0.052	290	N.S
Ankles	-0.067	290	N.S
Feet	0.053	290	N.S
Toes	0.073	290	N.S

Table 61 shows the relationship between the musculoskeletal pain among the respondents experienced by the respondents in past 12 months with their monthly personal income (in Rs.). The data shows the significant negative correlation between the musculoskeletal pain in neck ($p<0.05$)and knees ($p<0.01$) with the monthly personal income of

respondents. The null hypothesis is rejected for the Musculoskeletal pain experienced by the respondents in past 12 for the two body parts ie. neck and knees. The null hypothesis is accepted for the Musculoskeletal pain experienced by the respondents in past 12 for the other body parts of the respondents. Thus it can be concluded that the higher the personal monthly income of the respondents low was the Musculoskeletal pain experienced by the respondents in their neck and knees where as the occurrences of Musculoskeletal pain experienced in other parts of the body of the respondents was not related to the monthly personal income of the respondents.

The long teaching hours, continuous and poor body posture of the respondents while teaching viz. standing, using black board could be the cause of the musculoskeletal pain among the respondents. Thus, the null hypothesis stating that there exists no relationship between musculoskeletal pain experienced by the respondents in past 12 months with their Monthly Personal Income (in Rs.) was partially accepted. Similar results were found in a research undertaken by Darwish and Zuhair (2013).They found that the salary of the respondents did not have significant relationship with their musculoskeletal disorders.

The relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Monthly Family Income (in Rs/-)was analysed using Pearson's Correlation(Table 62).

Table 62: Correlation showing the relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Monthly Family Income (in Rs/-).

Musculoskeletal Pain in Body Parts	Pearson Correlation	df	Level of Significance
Neck	-0.116	290	0.05
Upper Back	-0.183	290	0.01
Lower Back	-0.206	290	0.01
Shoulders	-0.195	290	0.01
Arms	-0.111	290	N.S
Elbows	-0.188	290	N.S
Wrists	-0.100	290	N.S
Hands	-0.139	290	0.05
Fingers	0.095	290	N.S
Hips	-0.115	290	N.S
Thighs	-0.100	290	N.S
Knees	-0.151	290	0.01
Calf	-0.134	290	0.05
Ankles	-0.099	290	N.S
Feet	-0.017	290	N.S
Toes	0.090	290	N.S

The results of the Pearson correlation for the musculoskeletal pain experienced by the respondents and their monthly family income showed no significant correlation existed between them. This indicates that the musculoskeletal pain in neck, upper back, lower back, shoulders, hands and kneesamong the respondents were correlated

with their monthly family income. Therefore, the null hypothesis stating that there exists no significant correlation between musculoskeletal pains experienced by the respondents in past 12 months with their monthly family income was partially rejected.

Teachers were suffering from musculoskeletal pain in various body parts (refer 56). They were also experiencing radiating pain from back to their legs and from their neck and shoulders towards their arms. The higher monthly family income indicates the more opportunities or resources to recover or cure the musculoskeletal pain among the respondents. However, those who had less monthly family income might have different priorities to spend money. However, the present findings as shown in table 56 indicated no significant relation in the same.

Kortt and Baldry (2002) found that the adults with higher income levels were less likely to have musculoskeletal disorder among them but the significant relationship with income group was not observed with those who already were suffering from MSD.

The relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Type of Family was analysed using Pearson Correlation (Table 63).

Table 63: Correlation showing the relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Type of family.

Musculoskeletal Pain in Body Parts	Pearson Correlation	df	Level of Significance
Neck	0.145	290	0.05
Upper Back	0.046	290	N.S
Lower Back	-0.022	290	N.S
Shoulders	0.075	290	N.S
Arms	0.102	290	N.S
Elbows	0.078	290	N.S
Wrists	0.056	290	N.S
Hands	-0.017	290	N.S
Fingers	0.068	290	N.S
Hips	0.026	290	N.S
Thighs	0.030	290	N.S
Knees	0.003	290	N.S
Calf	0.097	290	N.S
Ankles	0.001	290	N.S
Feet	0.005	290	N.S
Toes	0.071	290	N.S

Table 63 highlights the results of the Pearson correlation between the musculoskeletal pain experienced by the respondents in past 12 months in their various body parts with their type of family. It showed no significant correlation existed between the selected variables accept

for neck reign of the respondents. The null hypothesis is rejected for the Musculoskeletal pain experienced by the respondents in past 12 for the one body part, ie. neck.

The null hypothesis is accepted for the Musculoskeletal pain experienced by the respondents in past 12 for the other body parts of the respondents. Thus it can be concluded that the Musculoskeletal pain experienced in other parts of the body of the respondents was not related to the type of family of the respondents. Thus, the null hypothesis stating that there exists no relationship between musculoskeletal pain experienced by the respondents in past 12 months with their type of family was accepted.

The present data indicates that the respondents' musculoskeletal pains had no relation with their type of family. The reason could be the amount of time they spend at home and at their workplace. The present data also highlighted that a majority of the respondents spent at least five hours daily in teaching at their school (refer table 13) and take only break during their work hours (refer table 17). It indicates the exhausting work pattern that might cause musculoskeletal pains among teachers. It can be inferred from this data that the teachers were spending more time outside their house and thus, they were not much involved in their household work. This could be the reason that their type of family did not have any relation with their musculoskeletal pains experienced.

In order to examine the correlation between Musculoskeletal pain experienced by the respondents in past 12 months with their number of family members, Pearson Correlation was utilised (Table 64).

Table 64: Correlation showing the relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Number of Family Members.

Musculoskeletal Pain in Body Parts	Pearson Correlation	df	Level of Significance
Neck	-0.72	290	N.S
Upper Back	-0.002	290	N.S
Lower Back	0.043	290	N.S
Shoulders	-0.069	290	N.S
Arms	-0.091	290	N.S
Elbows	-0.064	290	N.S
Wrists	0.015	290	N.S
Hands	0.008	290	N.S
Fingers	-0.055	290	N.S
Hips	0.011	290	N.S
Thighs	0.005	290	N.S
Knees	0.054	290	N.S
Calf	0.007	290	N.S
Ankles	0.051	290	N.S
Feet	-0.26	290	N.S
Toes	-0.076	290	N.S

Table 64 showcases the results for the Pearson correlation between the musculoskeletal pain experienced by the respondents in their various body parts and their number of family members. The results showed no significant correlation between the musculoskeletal pain

and the number of family members of the respondents. This indicates that the musculoskeletal pain experienced by the respondents in past 12 months were not relation with their number of family members. Therefore, the null hypothesis stating that there exists no significant correlation between the musculoskeletal pain experienced by the respondents in past 12 months with their number of family members was accepted.

It can be inferred from the findings presented in the table 60 that the respondents were experiencing musculoskeletal pain in their neck, upper back, lower back, shoulders, arms, elbows, wrists, hands, fingers, hips, thighs, knees, calf, ankles, feet and toes was not related with their number of family members. It suggests that they were experiencing the musculoskeletal pain irrespective of the number of members in their family. Thus, the null hypothesis stating that there exists no relationship between musculoskeletal pain experienced by the respondents in past 12 months with their number of family was accepted.

To find out the Relationship between Musculoskeletal pain experienced by the respondents in past 12 months with the Psychosocial factors among respondents the Pearson's Correlation was computed (Table 65).

Table 65: Correlation showing the relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with their Psychosocial factors among respondents

Selected Variables	Pearson Correlation	df	Level of Significance
Psychosocial factors among respondents	0.013	290	0.05

df= Degree of Freedom

Table 65 shows that there existed no variation in the musculoskeletal pain experienced by the teachers during past 12 months with the Psychosocial factors among the respondents. This means, the respondents had experienced the musculoskeletal pain in some or the other form irrespective of their Psychosocial factors among the respondents. Therefore, the null hypothesis stating that there exists no relationship between the musculoskeletal pain experienced by the respondents in past 12 months with their Psychosocial factors among the respondents was rejected.

The psychosocial factors included the constant stress, nervousness, overburden of work, tiredness due to work at school and also at home, personal life circumstances, personal problems. The present data also indicated that the majority of the respondents reported to the existence of psychosocial factors that had induced their musculoskeletal pain (refer table 49). Alias, Karuppiah, and Perumal (2020) mentioned that teachers were the on the high risk for musculoskeletal disorder and found that BMI, sports activity, type of shoes, teaching hours, and standing hours during school were significantly associated risk factors with musculoskeletal disorder.

To find out the Relationship between Musculoskeletal pain experienced by the respondents in past 12 months with the problems faced by them while carrying out various activities the Pearson's Correlation was computed (Table 66).

Table 66: Correlation showing the relationship between the Musculoskeletal pain experienced by the respondents in past 12 months with the problems faced by them while carrying out various activities.

Selected Variables	Pearson Correlation	df	Level of Significance
The problems faced by the respondents while carrying out various activities	0.401	290	0.01

df= Degree of Freedom

The Pearson's correlation analysis between the musculoskeletal pain experienced by the respondents and the problems faced by the respondents in past 12 months while carrying out various activities showed a significant correlation between the two (Table 66). It can be inferred from this finding that the musculoskeletal pain among respondents and the problems faced by them were correlated and had influenced each other. It was discussed in the previous section that respondents had faced problems due to their musculoskeletal pain experienced while performing various activities.

However, respondents were facing numerous health related problems due to musculoskeletal pain viz. Migraine, Frozen shoulder, Vertigo, Patelofemoral Pain Symptoms, Back Pain, Painful Heel, Cervical Spondylosis, Shoulder Impingement Syndrome and Periformis Tightness and many more (refer table 57). These are severe health conditions that might stays for years and inhibit the routine work of teachers. The data presented in the table 67showcased the relation between the musculoskeletal pain and the troubles faced by respondents while performing various activities. Therefore, the null hypothesis stating that there exists no relationship between the

Musculoskeletal pain experienced by respondents in past 12 months with the problems faced by them while carrying out various activities was rejected.

In light of this finding it would not be wrong to say that the musculoskeletal pain and the troubles faced by the respondents were correlated and influenced each other. Temesgen, **2019** also found that static head down postures, elevated arm over shoulder. Prolonged sitting, hypertension were significantly associated with prevalence of neck and shoulder pain among the teachers.

SECTION 7: Ergonomic Intervention Programme

An Ergonomic Intervention Programme can reduce the physical demand of manual materials-handling work, thus reducing the chances of musculoskeletal disorders. Such interventions play an important role in improving the production without causing injury to workers. (Khan et al.,2013).The researcher had come across several ergonomic researches that have been emphasizing upon training the workers and providing education aid for the workers on the job to reduce occupational hazards and increase the productivity. On-the-job worker training plays most important role in any Ergonomic Intervention Programme. For above reason the researcher wanted to develop and execute an Ergonomic Intervention Programme for the Municipal Primary School Teachers and the School Authorities in suggesting healthy Teacher Friendly Postures and Classroom Furniture Designs for the Teachers. The researcher had proposed furniture designs for Table, Writing Board, and Stepping Stool for the Classroom.

1.7.1.1. Permission undertaken from the Principles of Municipal Primary schools

1.7.1.2. Via telephonic conversation the researcher had contacted 56 principals. The researcher asked for the permission for the conducting the intervention programme. From the total of 372 teachers working in 132 schools of Vadodara city and Anand City of Gujarat only 20 Municipal Primary School Schools had given permission for conducting the intervention programme. The researcher sensitized the Principles of Municipal Primary schools regarding the importance of the ergonomic intervention programme, adapting the healthy teacher friendly postures and the benefits of using the new proposed furniture (Stepping stool).

1.7.1.3. Orientation of the Teachers of Municipal Primary schools

The 20 principals had given permission to the researcher to contact the teachers to participate in intervention programme. The Municipal Primary School Principles also permitted the researcher to submit the stepping stool furniture to each school for one week and use it in the classrooms as required during sessions. The teachers had to give feedback to the researcher after using the stepping stool for 7 days as a part of the intervention programme.

1.7.1.4. Rapport Building with the Municipal Primary schools Teachers

After due permission from the municipal primary school principles and higher authorities the researcher contacted the municipal primary school teachers. The Municipal Primary School Principals were contacted by the researcher as they all were busy with many tasks, upcoming events like election duty and exams as well.

The principles requested the researcher to join with the teacher via internet online. The researcher had designed and planned intervention programme with the help of “Google Meet” platform so the researcher can connect with all. Due to different schedules and duties the intervention programme was conducted more than once. After the normal day-to-day conversation and making the teachers relaxed started explaining regarding importance of healthy working postures while teaching and the proposing teacher friendly classroom furniture designed by the researcher.

The researcher had designed the stepping stool on the basis of the findings of the research. The information

regarding importance of healthy working postures while teaching were developed in English language and then translated in Gujarati language with the help of expert in Gujarati language as many teachers did not have a command on English language. The guidelines were as follows and the proposed teacher friendly furniture designs are also given below:

1.7.2. Ergonomic Intervention Programme

For the present research the ergonomic intervention programme was developed which comprises of two aspects.

1.7.2.1. Awareness Programme for Healthy Teacher Friendly Postures:

The researcher proposed providing awareness among Municipal Primary School Teachers, Principals and the School Authorities in suggesting Healthy Teacher Friendly Postures in the form of power point presentation which can be distributed to each teacher with proper channel via email. Presentation included pointers for Healthy Teacher Friendly Postures adopted during teaching in municipal primary school classroom. These Healthy Teacher Friendly Postures were divided in four sub divisions. They were on Stand Smart, Sit Smart, Walk Smart and Lift Smart. The researcher proposed these Healthy Teacher Friendly Postures to reduce musculoskeletal pain while working in Municipal Primary School.

Stand smart:

- Try to relax your shoulders and let your arms hang by your sides, rather than gripping them tightly into your sides while you are taking class.

- Don't slouch. Maintain a neutral pelvic position. If you must stand for long periods, place one foot on a low footstool to take some of the load off your lower back. Alternate feet. Good posture can reduce the stress on back muscles.
- Try to maintain a good posture when you're standing. While sanding change your position often and avoid holding your neck in fixed or twisted positions while standing.

Sit smart:

- Choose a seat with good lower back support, armrests and a swivel base. Placing a pillow or rolled towel in the small of your back can maintain its normal curve. Keep your knees and hips level. Change your position frequently, at least every half-hour.
- A good chair that supports you properly and can be adjusted to your needs could also help you keep a good working position.
- Bad posture or working habits, such as slouching at your desk should be avoided. When sitting down on the chair try to avoid leaning forwards and resting on your arms too much on the table. Sit in an upright position
- If you use a computer keep the keyboard and monitor directly in front of you, so you don't have to turn your head or twist your body. Keep the mouse within easy reach so you don't have to stretch for it.
- Support your lower back with a pillow, cushion or a chair with lumbar support to improve your upper body posture.
- If your arm is really sore, keep it supported and comfortable with a cushion or pillow on your lap.

- Limit the amount of time you spend sitting looking down at tablets. Change your position often. While sitting near table avoid holding your neck in fixed or twisted positions.

Walk smart:

- Take short walk in the lobby or school corridors whenever if possible or at the end of period.
- If you have to sit or stand for long duration while you teach in classroom, try to get up and move around every so often. Try to gently move your shoulders and neck through their full range of movement regularly, to stop them getting stiff and sore.

Lift smart:

- Avoid heavy lifting, if possible, but if you must lift something heavy, let your legs do the work. Keep your back straight — no twisting — and bend only at the knees. Hold the load close to your body. Find a lifting partner if the object is heavy or awkward.
- Use bags with long straps and carry heavy books with the straps crossed over your body from shoulder to hip. The key is to try to spread the load evenly.

1.7.2.2. Proposed Classroom Furniture Designs for the Municipal Primary School Teachers:

For improving the work environment of the classroom the researcher has proposed furniture designs for the teachers to facilitate them in the classroom during teaching. The researcher has proposed design for writing table, writing board and also for testing made a furniture piece of the proposed stepping stool for the respondents to use while teaching to reach teaching material stored in upper shelf of storage unit. The stepping stool will be

useful for the teachers having shorter height. The researcher had Designed and proposed on paper by using Auto Cad software. The list of designs was titled as:

1. Front, Side and Back View of Existing Chair Design
2. Plan and 3D View of Existing Teacher's Chair
3. Proposed Chair Design Option-1
4. Proposed Chair Design Option-2
5. Proposed Chair Design Option-3
6. Proposed Chair Design Option-4
7. Existing Design of Writing Table
8. Proposed Design of Writing Table
9. Detailed Design of Proposed Writing Table
10. 3D View of Proposed Writing Table
11. Existing Design of Writing Board
12. Proposed Writing Board Design -1
13. Proposed Writing Board Design -2
14. Plan, Elevation of Proposed Stepping Stool Design
15. 3D View of Proposed Stepping Stool Design

The proposed designs were made with the help of Auto Cad software. All the designs were created by the use of Auto Cad 2017 version. For the proposed chair designs the researcher had proposed already available Ergonomically Designed Chair available online from the internet. The researcher also provided the details of chair manufactures and seller details along with price list and it detailed description which included links of online seller and other information.

Chair Designs for the classrooms

Existing Chair in the classroom

The findings in Table 38reviled that a few of the respondents were not at all comfortable with the width and height of the back rest of the chair they use as well as the height of the arm rest of the existing chair. It was uncomfortable to sit in it for longer duration. The back was not properly supporting the back of the respondents.

The chairs were old and in deteriorating condition. The chairs were having metal body. The back rest and chair seat were made up of wood. Due to the chair being old, the paint was torn off and in few chairs the armrests had been fallen off. The arm rest colour was black oil paint. The wood texture pattern laminates were applied on the back rest and chair seat. The metal surface of chair body was originally been painted with gray oil paint colour. The chair seat was having hard surface for seating. The chair in general made up of wood. It was observed by the researcher that cushions were placed at the back and on seat of the chair in some schools for comfort in seating. Few of the teachers had used cushion for increasing seating height. Thus, it would be advisable that the chairs with adjustable height be provided to the teachers along with a soft padded cushion on the seat and at the back of the chair.

Proposed Chair Designs for the classrooms:

Nowadays one can find such ergonomically design chairs easily online. The researchers proposed ergonomically designed chairs for the respondents teaching in the classrooms. The researcher had searched for ergonomic chairs online and proposed four designs for the

respondents. Some of the prominent features of these chairs were soft padded cushion on the seat and at the back of the chair, proper back support, adjustable height, availability of hand rest and 360 degree rotation. The researcher had provided seller information, price of the chair (as on the day searched online), manufacturer name and other specifications.

Proposed chair option 1:

Name: beAAtho Verona Mid Back Revolving Office Chair

Product Link: https://amzn.eu/d/59e14s5

Product Price: 3,789/- (information retrieved on 19/07/22)

Colour availability: Multicolour

Brand name: beAAtho

Manufacturer: beAAtho, Get expert product & service assistance at beAAtho (info@beaatho.co , +91 8080807550)

Chair Dimensions: 36D x 46W x 89H Centimetres

Style: Orange

Pattern: Verona

To be used in: Office, Desk, Study Room

Finish Type: Metal stand

Chair Material: Nylon frame with mesh material

Item Weight: 13 Kilograms

Arm Style: Fixed

Special Feature: Adjustable Height, Arm Rest, Ergonomic, Rolling, 360 degree swivel.

Other features:

It is fully adjustable chair which has Ergonomic Nylon back support. The chair is having breathable mesh at back support to keep the user sweat free. It is having moulded foam seat having heavy quality soft cushion for long support while doing work for long hours. Pull and

push back mechanism for adjusting back between 90 to 135 degrees.

The chair has hydraulic cylinder with height adjustment feature to change seat height. The chair has adjustable height which can support the respondents with different heights. Hold up to 110 kg of weight.

The back rest has Smart Tilting Mechanism with locking feature at the back The chair legs has metal coated base with heavy metal wheel base for smooth 360 degree swivel.

Proposed chair option 2:

Name: Green Soul Seoul Office Chair

Product Link: https://amzn.eu/d/h819AVy

Product Price: 3,880/- (information retrieved on 19/07/22)

Colour availability: Bold Gray

Brand name: Green Soul

Manufacturer: Green Soul, Green Soul Ergonomics Pvt. Ltd., Maharashtra, India. Customer Care:- +91 8448444695, info@greensoul.online

Chair Dimensions: 44D x 57W x 102H Centimetres

Style: Contemporary

To be used in: Office, Desk, Study Room

Finish Type: Metal stand

Chair Material: Upholstered back

Item Weight: 11 Kilograms

Arm Style: Fixed

Special Feature: Adjustable Height, Arm Rest, Ergonomic, Rolling, 360 degree swivel.

Other features:

It is fully adjustable chair which has Ergonomic upholstered back support. The chair is having breathable

mesh at back support to keep the user sweat free. It is having moulded foam seat having heavy quality soft cushion for long support while doing work for long hours. Pull and push back mechanism for adjusting back between 90 to 120 degrees.

The chair has hydraulic cylinder with height adjustment feature to change seat height. The chair has adjustable height which can support the respondents with different heights. Hold up to 125 kg of weight.

The back rest has Smart Tilting Mechanism with locking feature at the back The chair legs has metal coated base with heavy metal wheel base for smooth 360 degree swivel.

Proposed chair option 3:

Name: REDSPOT RAR-15 Executive Office & Home Computer Revolving Chair

Product Link: https://amzn.eu/d/6J8tI9b

Product Price: 3,699/- (information retrieved on 19/07/22)

Colour availability: Black

Brand name: REDSPOT

Seller details: https://amzn.eu/d/6J8tI9b

Chair Dimensions: 27D x 60W x 57H Centimetres

Style: Modern

Pattern: Solid

To be used in: Office, Desk and Study Room

Finish Type: Polished

Chair Material: Mesh material

Item Weight: 9.2 Kilograms

Arm Style: Fixed

Special Feature: Adjustable Height, Arm Rest, 360 degree swivel.

Other features:

It is fully adjustable chair which has Mesh back support. The chair is having breathable mesh at back support to keep the user sweat free. It is having fabric seat for doing work for long hours.

The chair has height adjustment feature to change seat height. The chair has adjustable height which can support the respondents with different heights. Maximum weight recommendation is 150kgs.The chair legs has metal coated base with heavy metal wheel base for smooth 360 degree swivel. This executive office chair features a 5-point heavy-duty base for added stability and has smooth nylon casters that allow you to move the chair around with ease. The easy-to-clean chair is ideal for comfort and cleanliness as well as easy maintenance.

Proposed chair option 4:

Name: Rose® Zebra Office/Study/Revolving Computer Chair

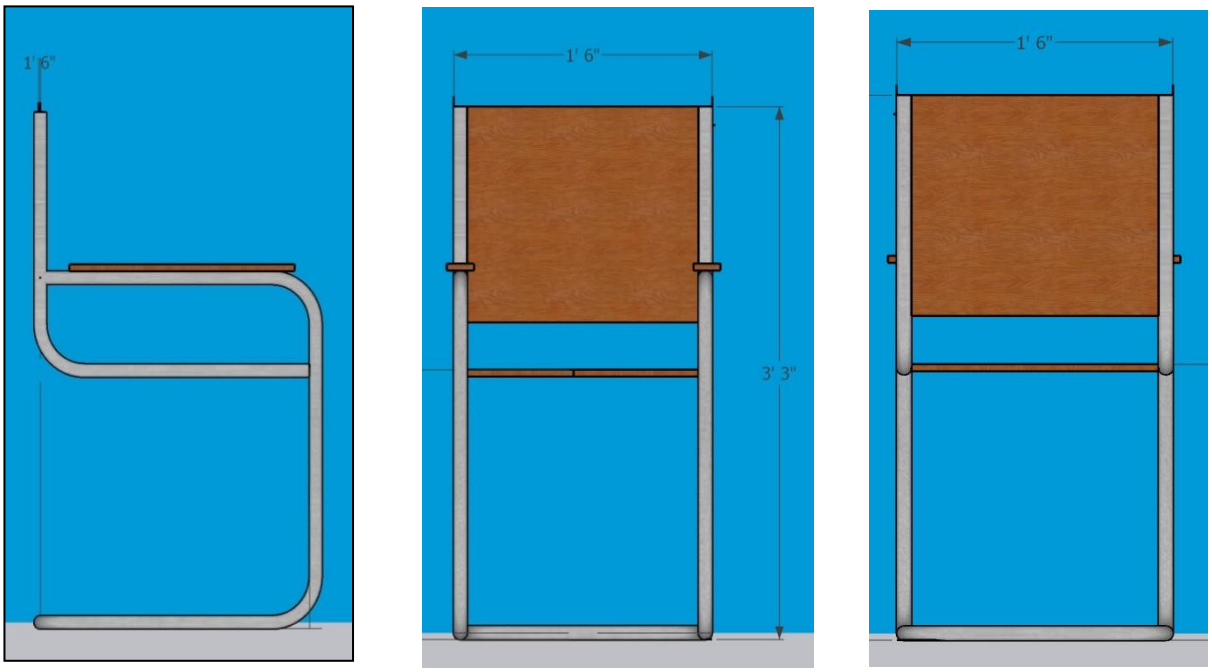
Product Link:	https://amzn.eu/d/3TfRNsC
Product Price:	3,499/-
Colour availability:	Black & Grey
Brand name:	Rose
Manufacturer:	ROSE, Rose Designer Chairs, Rose, Ulhasnagar, Maharashtra - 421003, For customer service and warranty related queries please contact_us: 8605419000 / 7264977666
Chair Dimensions:	36D x 46W x 89H Centimetres
Chair Dimensions:	45D x 44W x 92H Centimetres
Style:	Modern
To be used in:	Office, Desk, Study Room
Finish Type:	Metal stand, Cushion Back
Chair Material:	fabric material
Item Weight:	12 Kilograms

Arm Style: Fixed

Special Feature: Adjustable Height, Arm Rest, Ergonomic, Rolling, 360 degree swivel.

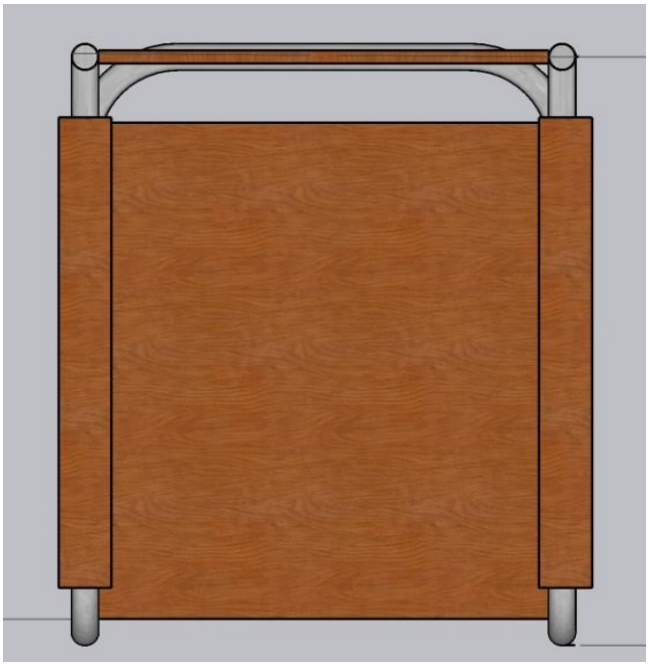
Other features:

It is fully adjustable chair which has premium fabric back support and seat cushion. It is having moulded foam seat having premium fabric cushion for long support while doing work for long hours. Pull and push back mechanism for adjusting back between 90 to 105 degrees. It gives Comfortable seating with lumber support. Hold up to 110 kg of weight.



Side View **Front View Back View**

Plate 15: Side View, Front View and Back View of Existing Chair



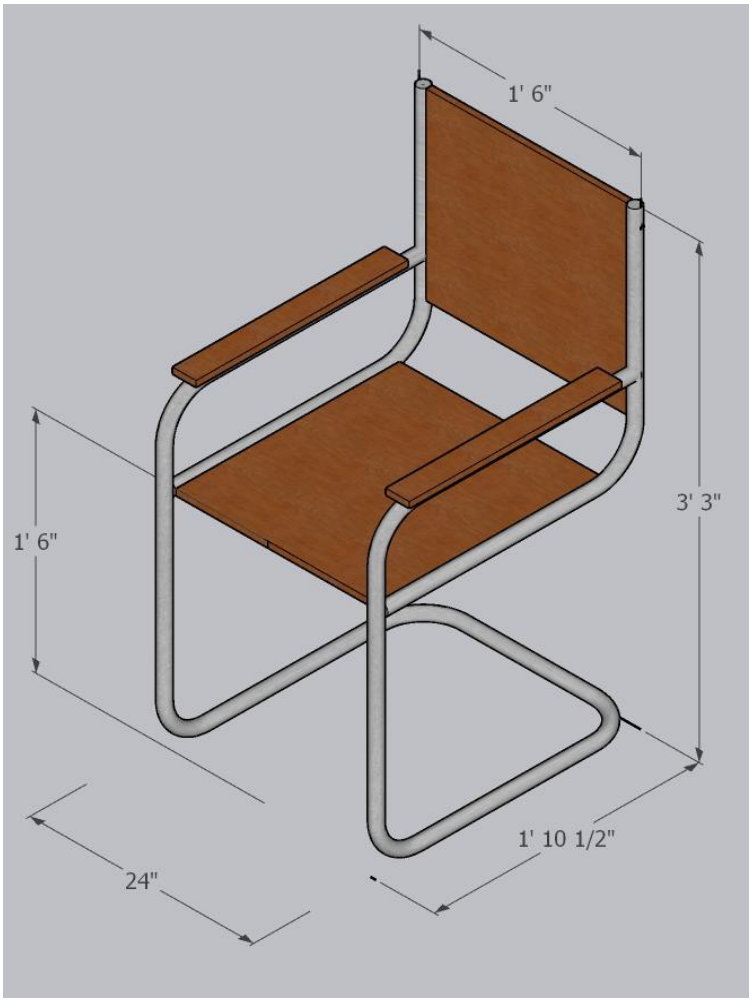


Plate 16 : Plan and 3d View of Existing Chair

Plate 17: Proposed Chair Design Option-1

CHAIR DESIGN 02

- **DIMENSIONS** : 17"D X 22"W X 40"H
- **MANUFACTURER NAME** : GREEN SOUL
- **PRICE** : Rs 3,880

Plate 18: Proposed Chair Design Option-2

Plate 19: Proposed Chair Design Option-3

CHAIR DESIGN 04

- **DIMENSIONS** : 15"D X 15"W X 39"H
- **MANUFACTURER NAME** : TIMBER CHEESE
- **PRICE** : Rs 3,499

Plate 20: Proposed Chair Design Option-4

Table Designs for the classrooms

Existing Table in the classrooms:

The table was made up of metal legs and top frame. The tabletop had similar wood patterned laminate as chair in the classroom. Crakes were prominent on the writing surface of the table. Table was having 4'-0" Length X 2'-0" Breadth X 2'-6" Height in dimension. The metal legs were having black colour painted on it. It has been found that the respondents perceived height of the table as least comfortable as compared to its width and length. The findings in Table 39 showed that respondents were not comfortable with the height, width and length of the writing table respectively.

Proposed Table Design for the classrooms:

The researcher proposed adjustable height of writing table for the teacher to avoid the discomfort level of the teachers while using writing table in the classroom. The height of table can change from 2'-9" to 4'-6" in inches. The lever mechanism at the side of the legs will help the user to adjust the writing height according to their requirements. This gives the user to work sitting as well as standing comfortable while working with the table.

The legs of the table are made of metal material. The legs are having upside down "T" shape and the thickness of both the legs are 3"x 3" of size proposed by the researcher. Base of legs are 1'-7" wide to support the top of the table. All the details of the drawing are displayed in the plate 22, 23 and 24.

The table top is made-up of Engineered Wood material. It is having wood textured print on the table top surface. The table

top is having surface size of 4’-0” x2’-0” in foot. The table top is divided in two parts, with one fixed surface having 1’6”x 2’-0” in size. And Another part of the table top which has inbuilt adjustable inclined side. The size of adjustable table top is 2’-6” x2’-0” of work surface. It can easily accommodate books and laptop on it. One can adjust the incline side at 20 °, 30°, 45° and 60° for reading and writing purpose. It can be adjusted according to the user activities like reading, writing, Laptop use and checking answer sheets.

The researcher designed and proposed additional storage which is removable located at base side (below fixed table top side). It has two drawers and one shelf with shutter. The storage unit has rollers fixed at the base of it so it can easily move anywhere as the user’s requirements. It is also made-up of Engineered Wood material. The table top and storage under were having smooth surface. The respondents were very pleased with the writing table design. The researcher had provided detailed design information to principal, teachers and “Nagar Prathmik Shikshan Samiti” for the use.

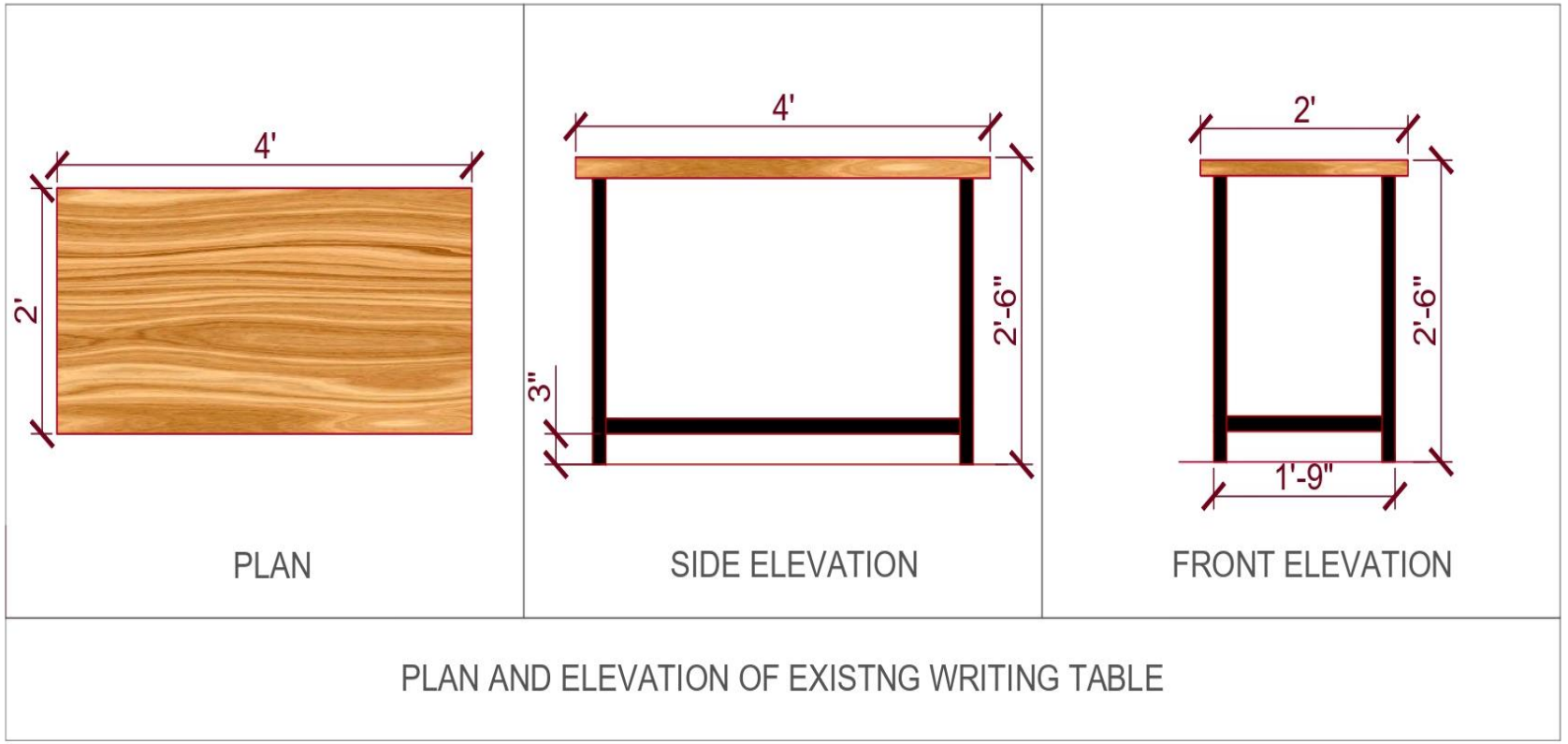


Plate 21: Existing Design of Writing Table

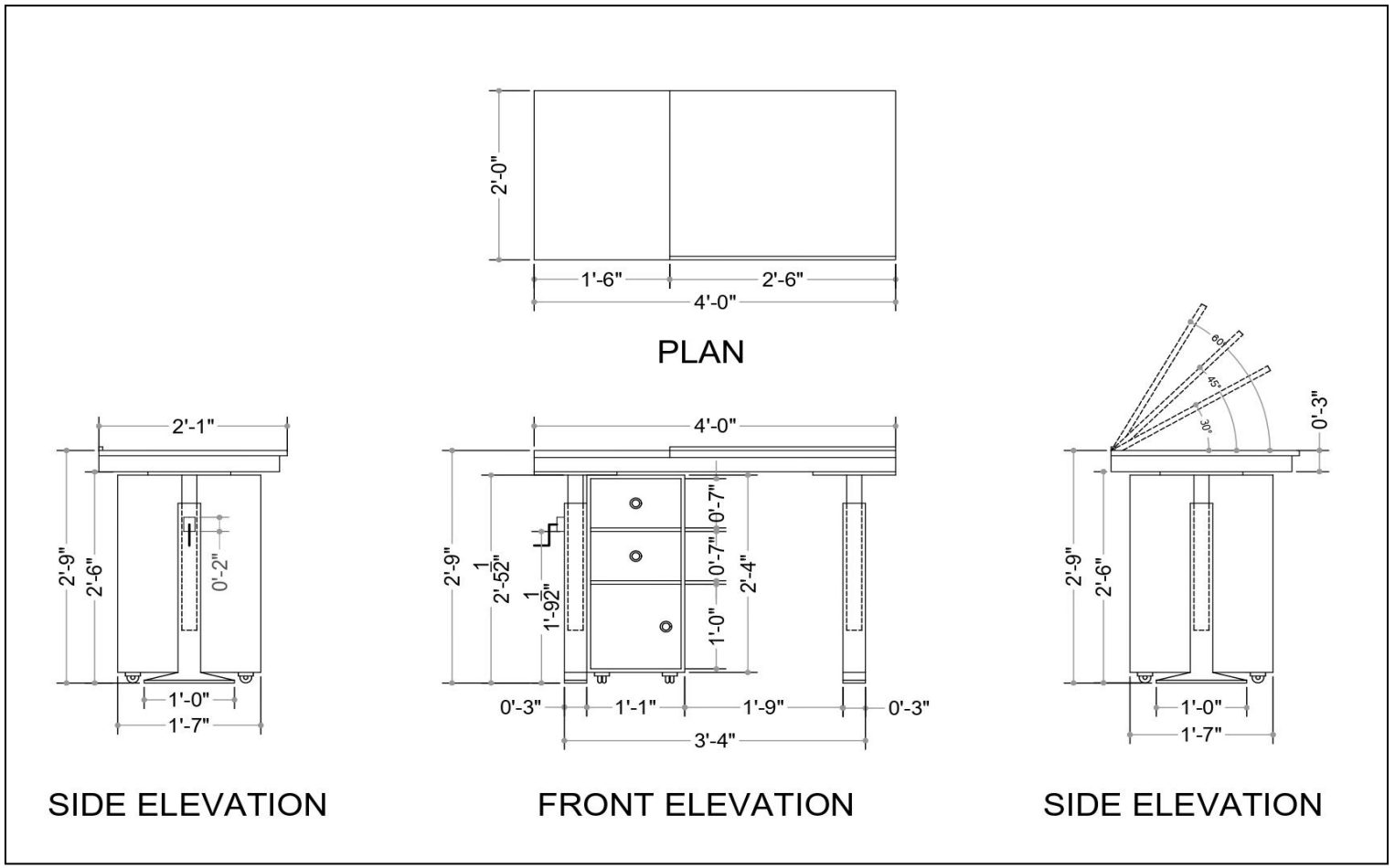


Plate 22: Proposed Design of Writing Table

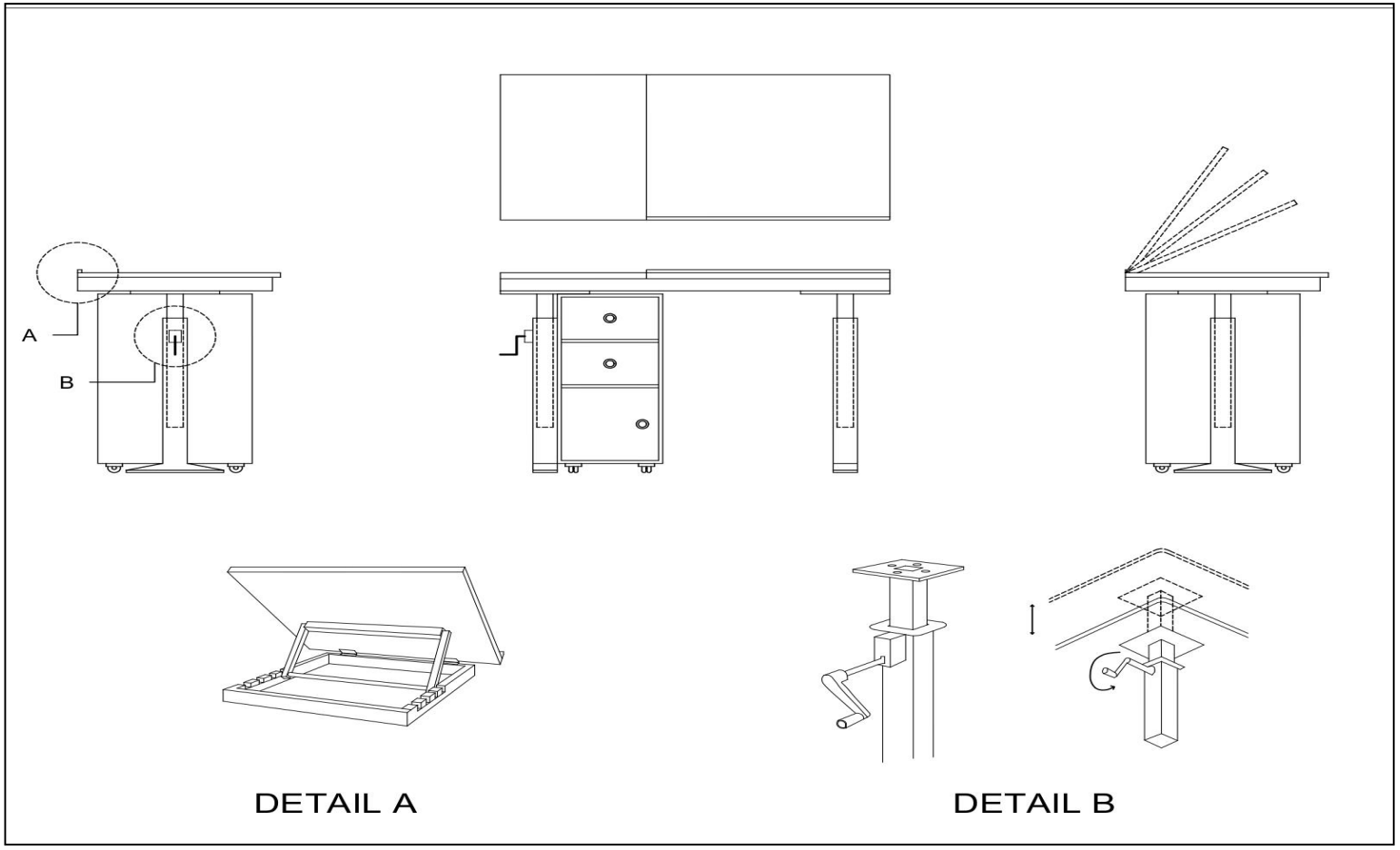


Plate 23: Detailed Design of Proposed Writing Table

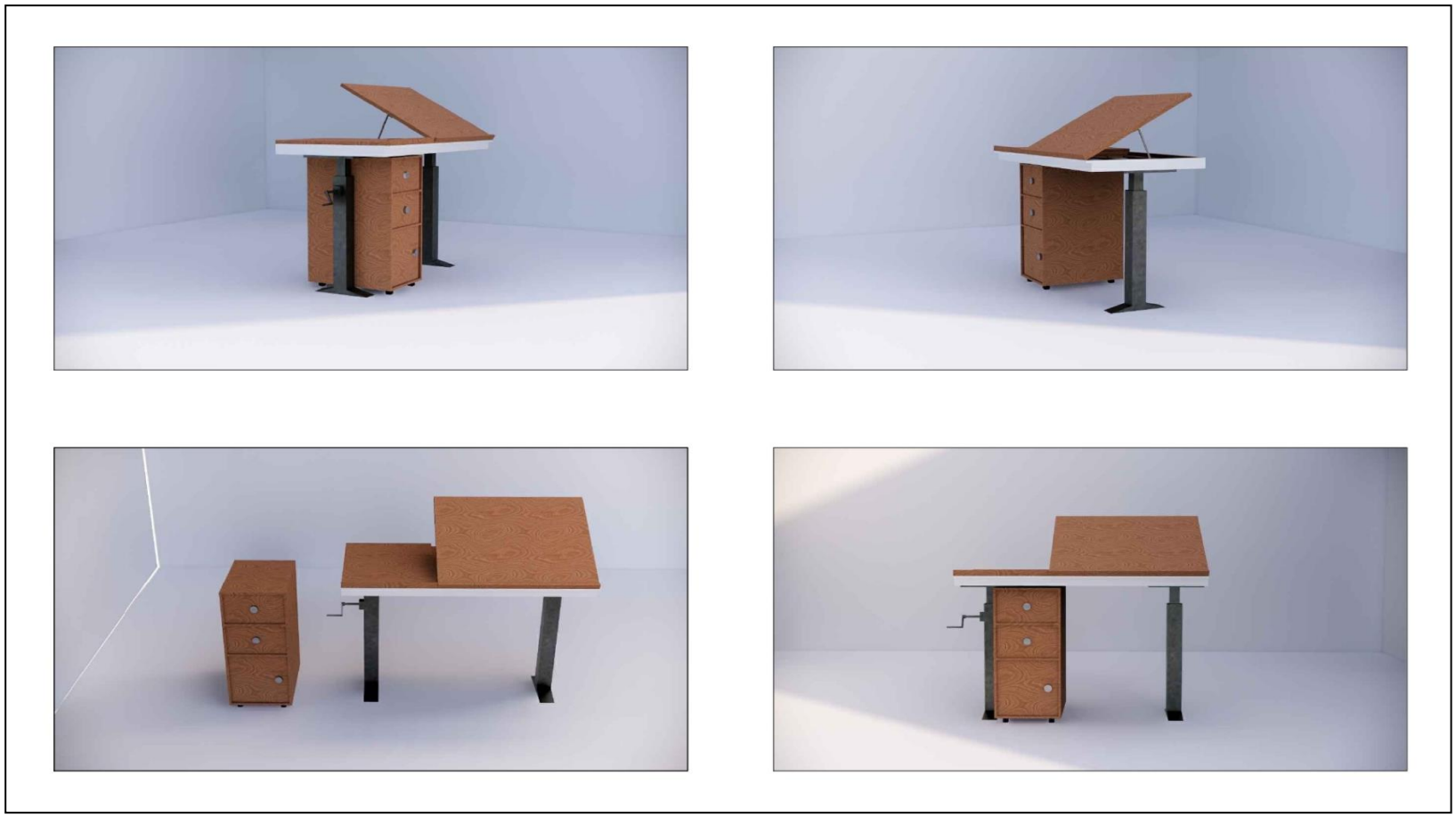


Plate 24: 3D View of Proposed Writing Table

Writing Board Designs for the classrooms

Existing

The data on existing classroom facility in the classroom reviled that majority of the classrooms had Green Writing Board for the teacher in the classroom (Table 34).The Green Writing Boards were fixed on wall between 29” to 31” from floor level (Plate 25). The respondents faced difficulties while reaching upper most part of the writing board during teaching in the classroom. For the both proposed design the already existing Green Writing Board would be used.

Proposed Design 1

The researcher had proposed option 1 to create a step like structure with the help of brick and cement on the floor near to the corner where the Writing Board is fixed on the wall. It will naturally increase the height of floor touching wall. The size of that step 8’x2’-6” in size for one to walk with ease. The structure is solid but the principals and the teachers did not prefer this proposal. The reason as told by the respondents that, it is taking more flooring space as well as it could be proved as hazardous for the students while moving in the break time.

Proposed Design 2

The researcher had proposed option 2 to design a lever mechanism fixed behind the green writing board which can increase and decrease the height of the Green Writing Board according the user’s need. For this the researcher had designed and proposed a lever mechanism moving on rotary system to increase and decrease the height 12 inch up and down accordingly. This mechanism takes about 6 inches if back wall space fixed directly behind the board (Plate 27).

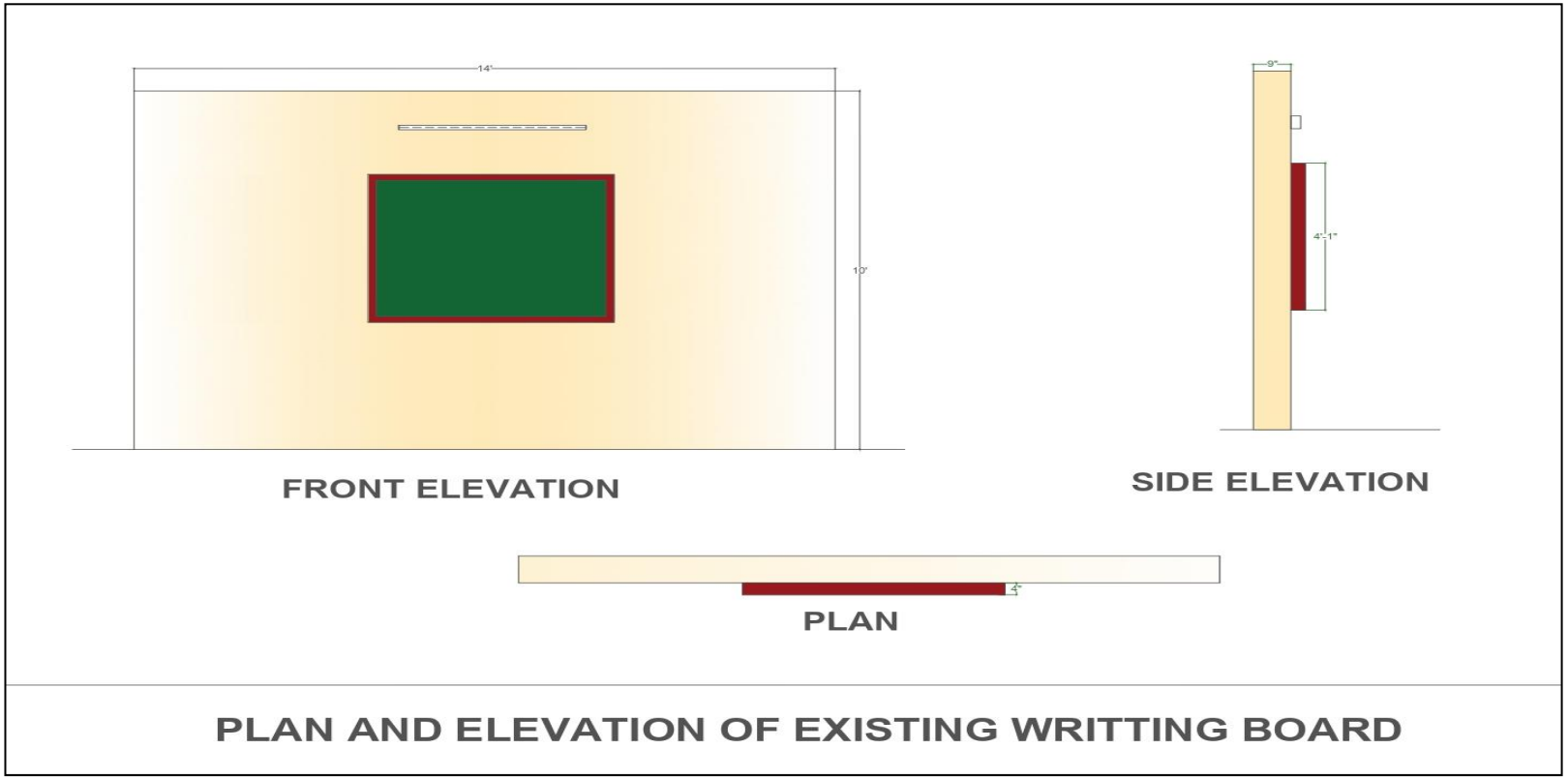


Plate 25: Existing Design of Writing Board

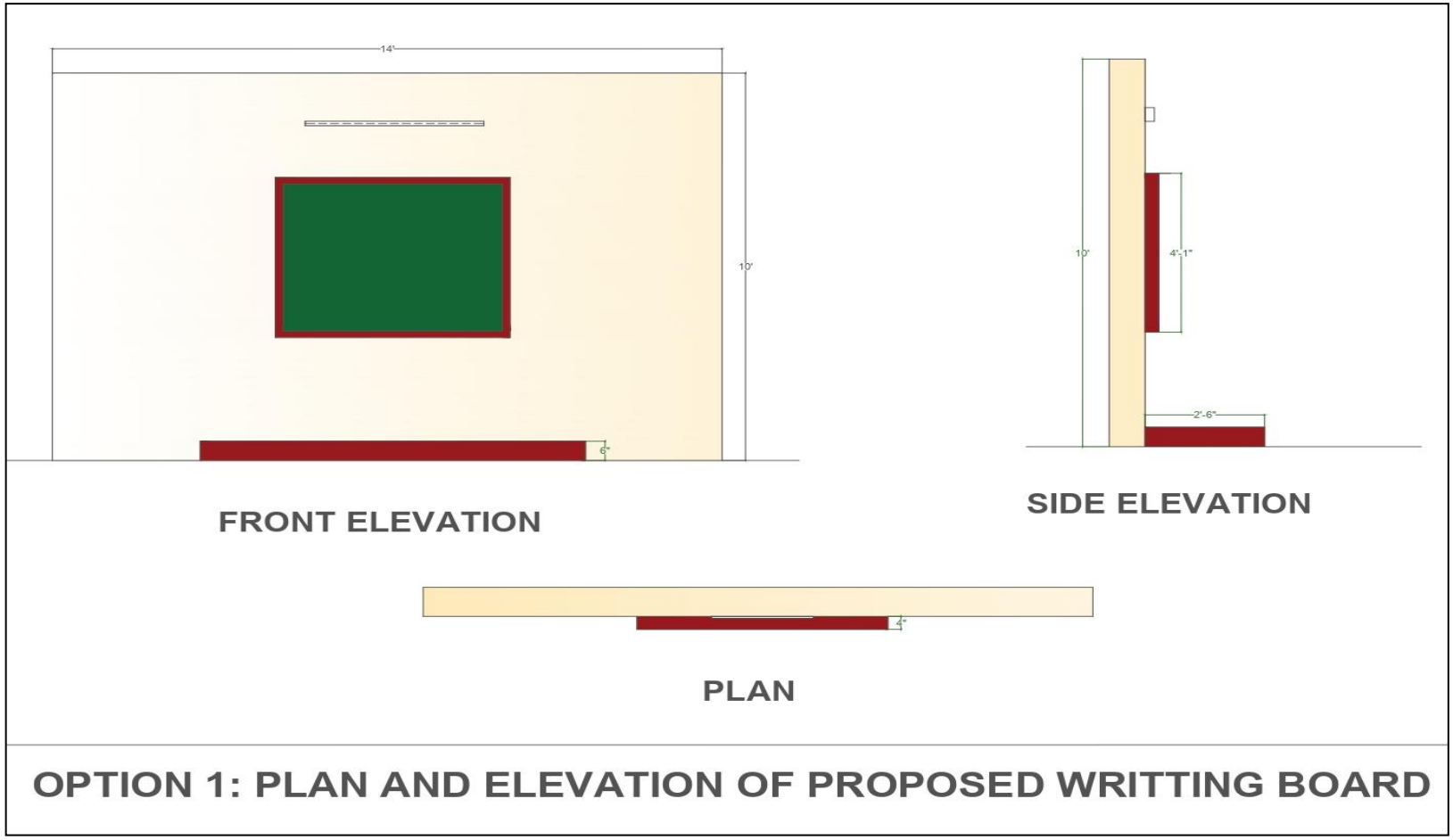


Plate 26: Proposed Writing Board Design -1

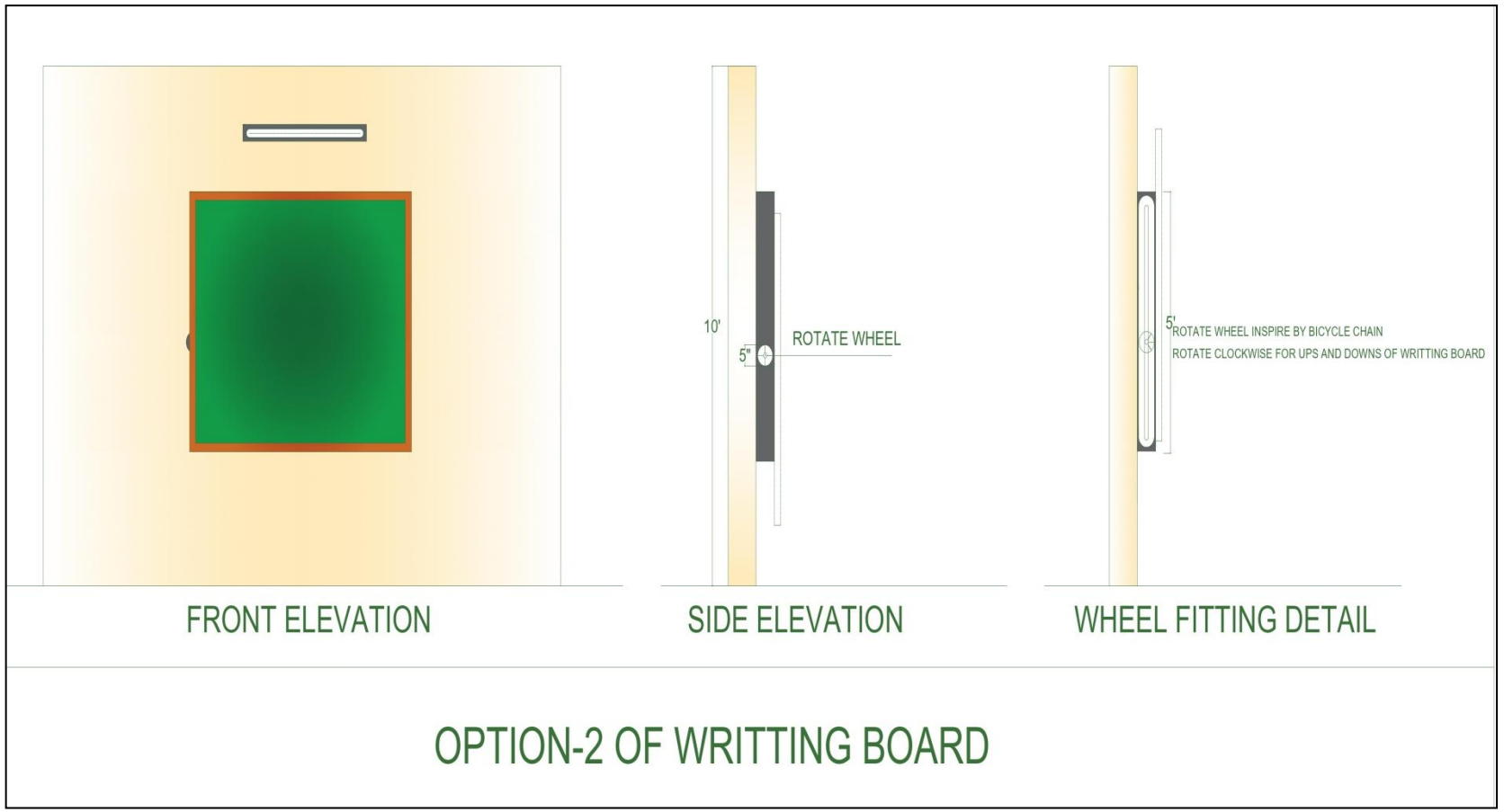


Plate 27: Proposed Writing Board Design -2

Stepping Stool Designs for the classrooms

As opined by the respondents that, they were not able to reach at the top shelf of the storage. The researcher designed, proposed and tested the stepping stool with the consent of the principals and teachers in the classroom setting. The stepping stool was 20”L x18”B x 12”H in size (Plate 28, 29, 30). The researcher had made the furniture with the help of local carpenter in the amount of Rs. 1800/- only.

The engineer wood was used for making the stepping stool. It can take weight up to 115 Kilograms. The stepping stool had two steps with each step having 9” of space. Around 39 respondents participated in testing of stepping stool. The respondents had provide feedback after using the stepping stool for one week. Respondents were highly comfortable with height, width, colour, and overall design of stepping stool.

Plate 28: images of stepping stoo

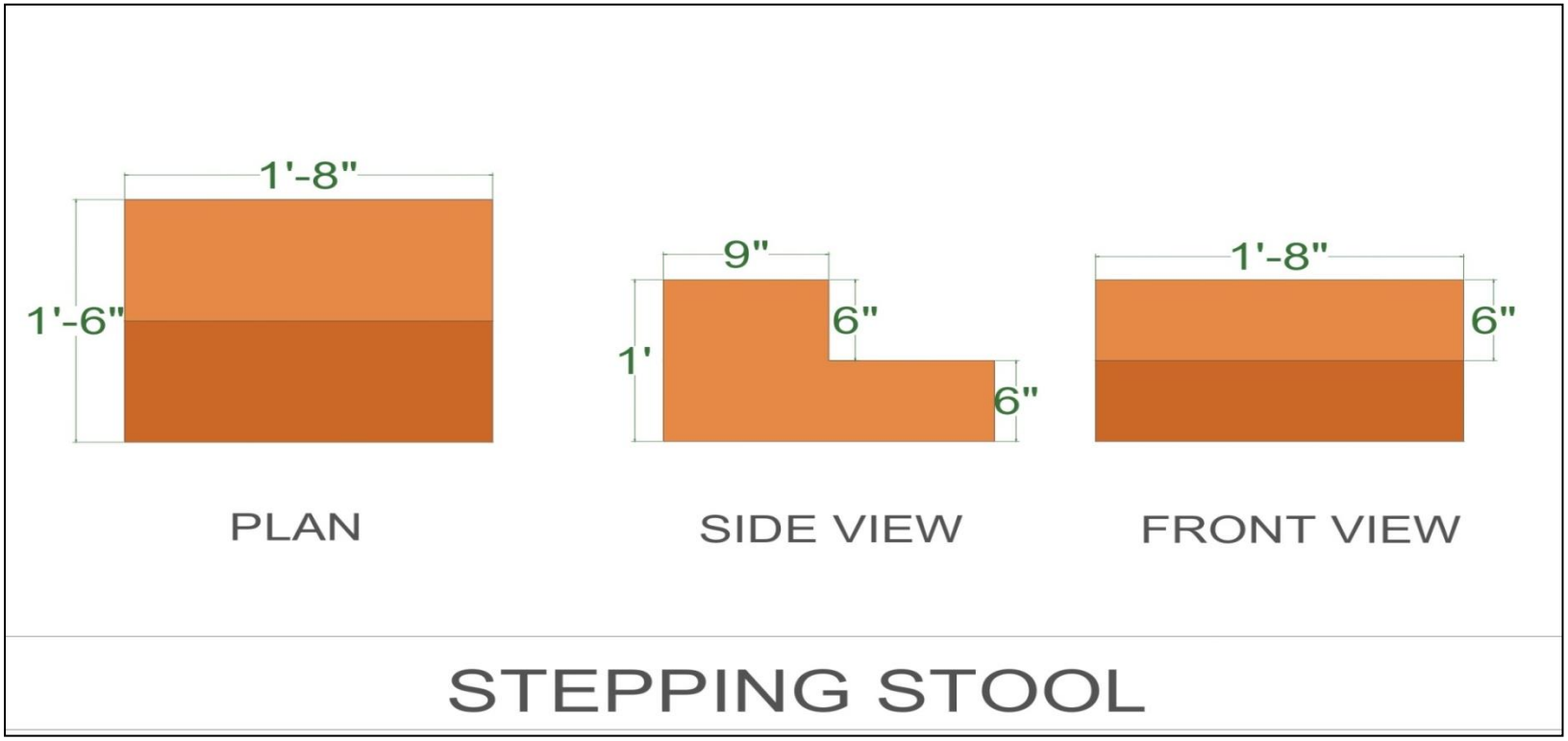


Plate 29: Plan, Elevation of Proposed Stepping Stool Design

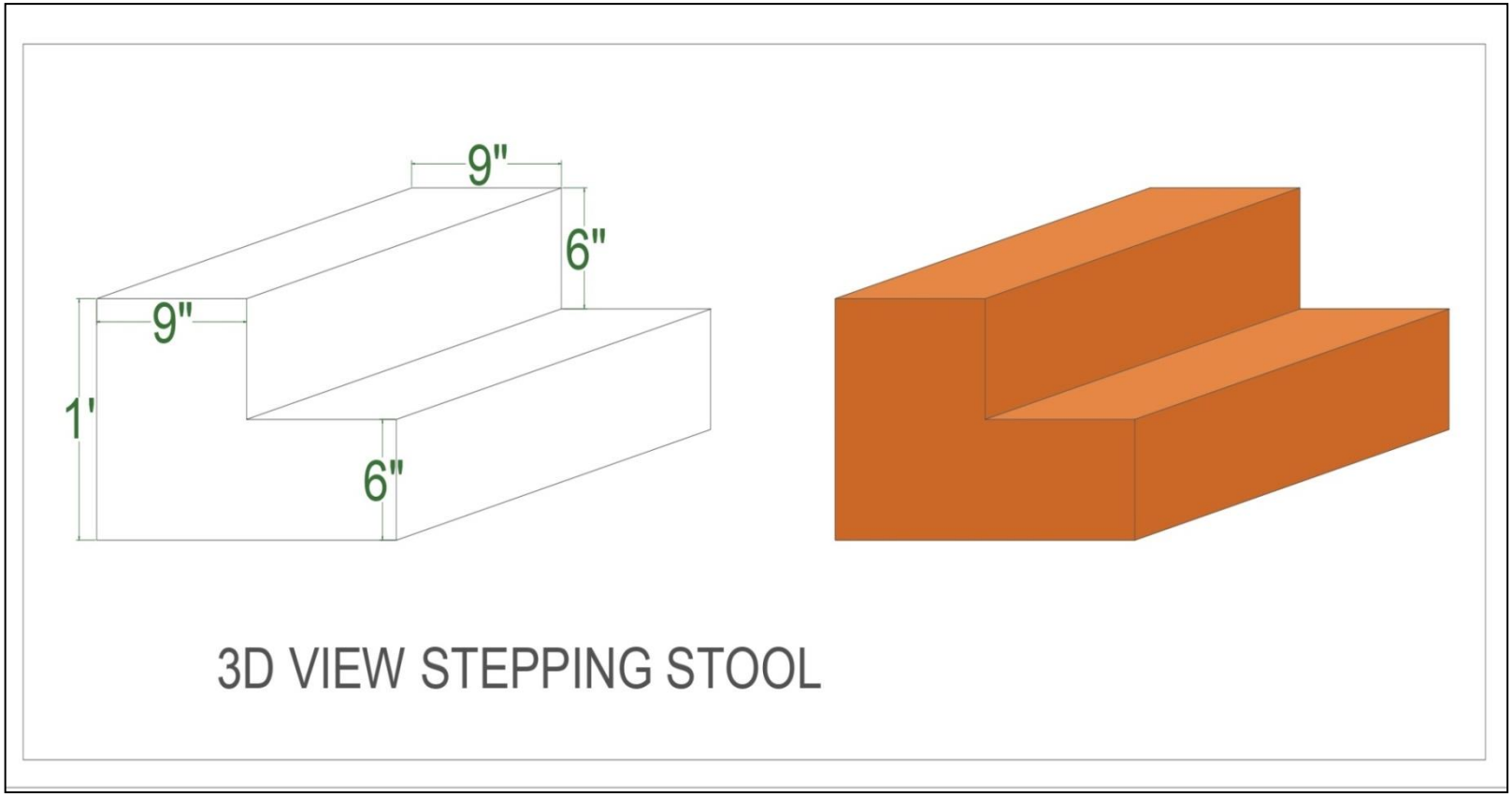


Plate 30: 3D View of Proposed Stepping Stool Design

1.7.2.3. Implementation of Ergonomic Intervention Programme

The researcher had given the stepping stool furniture to each school for one week to be used by the respondents in the classroom. Also the information regarding an ergonomically designed Stepping Stool was provided to the Municipal Primary schools Teachers explaining the need for the same. The researcher had persuaded the principals and teachers of municipal primary school to implement the healthy teacher friendly postures and implement the use of the stepping stool for seven days and give the feedback for the same. The information regarding design, size, color, texture and material also discuss with them.

After providing the Ergonomically designed Stepping Stool to the municipal primary schools teachers they were asked to rate the furniture and give their feedback after the using the same in the classroom. The feedback form contain the questions regarding the level of comfort while using stepping stool in size, color, texture, design and material used in manufacturing the same.

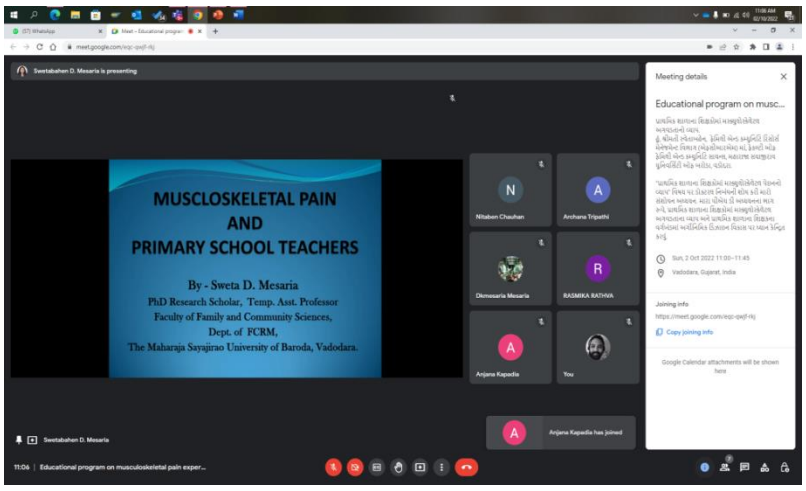


Plate 31: Screenshot of online ergonomic intervention programme

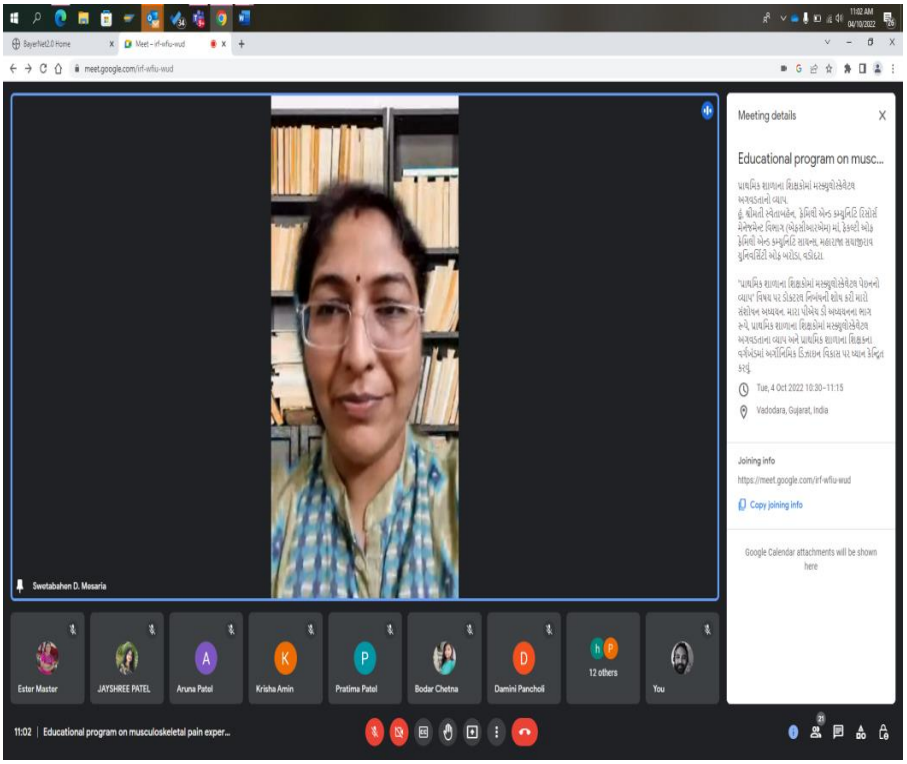


Plate 32: Screenshot of the researcher during online intervention programme

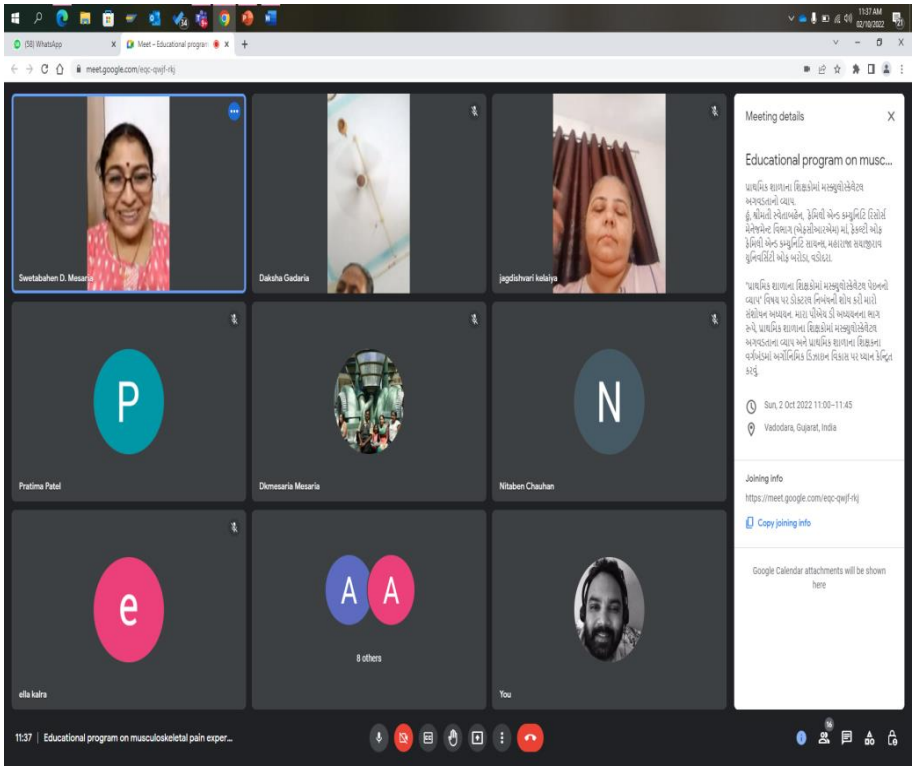


Plate 33: Screenshot of the participants during online intervention programme

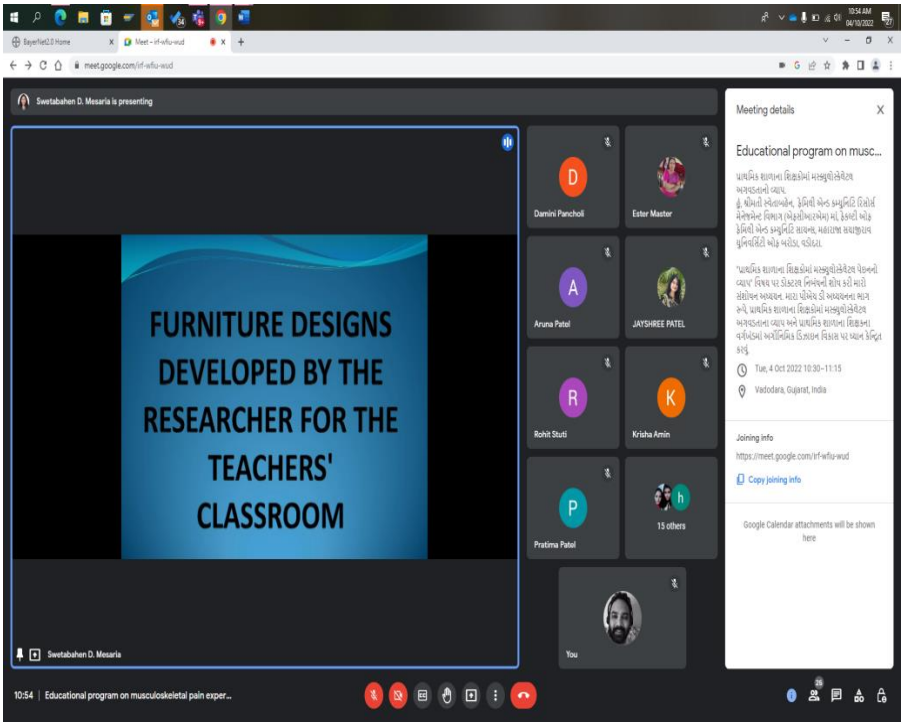


Plate 34: Screenshot taken during online intervention programme

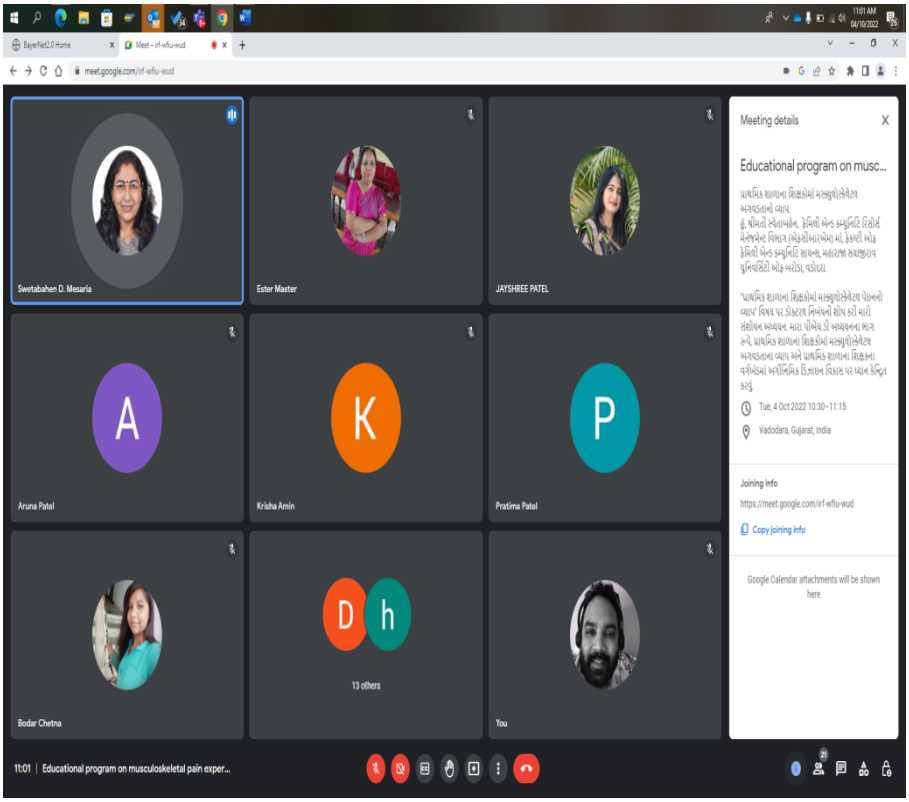


Plate 35: Screenshot of the respondents during online intervention programme

1.7.3. Feedback from the Respondents regarding the usage of proposed Furniture Design

After the giving the information to the participants regarding the importance of healthy working postures and using them while teaching can ease the pain experienced by them. The teachers felt happy and given positive gestures to the researcher. And one of the principles expressed her gratitude to the researcher by praising the furniture design.

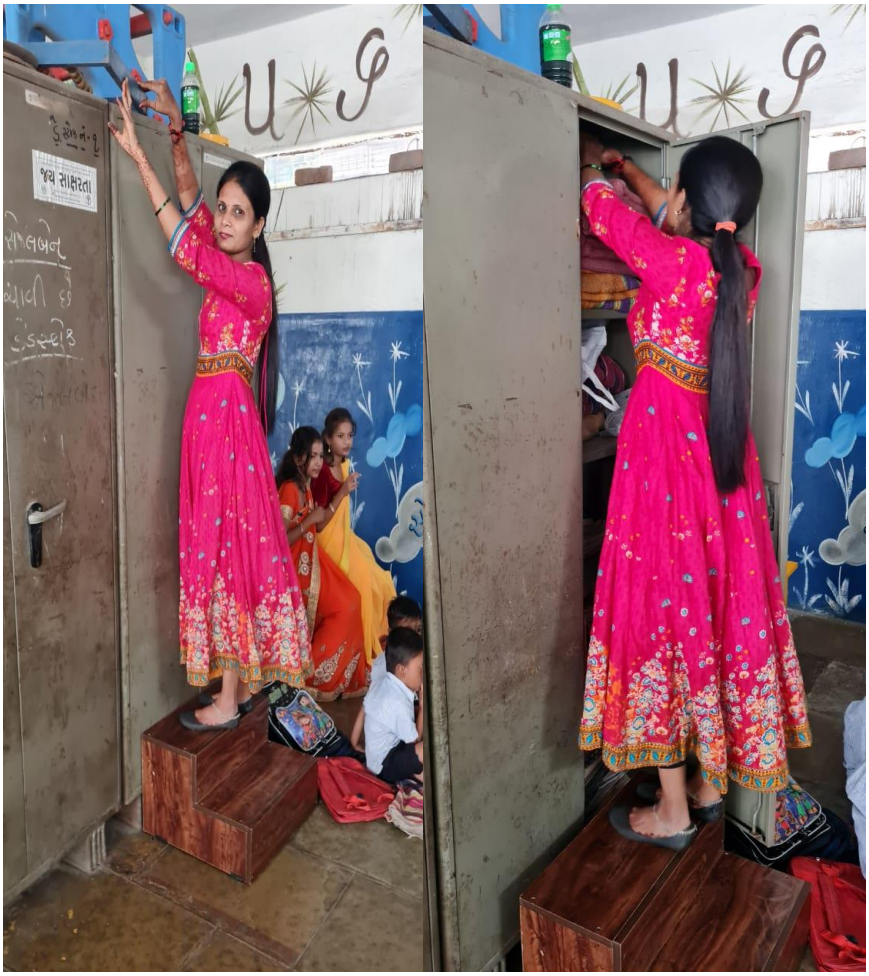


Plate 36: Respondent using the Stepping Stool in the Classroom

Plate 37: Respondents using the Stepping Stool in the Classroom

1.7.3.1. Feedback from the Respondents

The respondents for the Ergonomic Intervention Programme were teachers and principals of Municipal Primary Schools. They felt good by getting knowledge regarding healthy teacher friendly postures and classroom furniture designs for the teachers. The felt relieve by adopting the teacher friendly postures during the work without any pain and discomfort. The participants were happy to learn knowledge of healthy teacher friendly postures and instructed the teachers to implement them during teaching time in the classroom.

In the testing phase of Ergonomic Intervention Programme the researcher had provided the respondents furniture called stepping stool. The respondents used the stepping stool while teaching in the classroom. All the respondents were comfortable while using the steeping stool. Majority of the respondents were satisfied with proposed furniture designs for the classroom. Some of the respondents were asking whether they could buy the stepping stool for their personal use at their homes. The respondents were satisfied with the surface texture of stepping stool.

The respondents were highly comfortable with height and width of the stepping stool. The respondents werehighly comfortable with the colour, and overall design of stepping stool. Majority of the respondents were satisfied and highly comfortable with the stepping stool furniture design.

The principles wanted to buy the stepping stool for their teachers on the spot at the time of the furniture testing. The principals were happy with the overall design and size of the stepping stool. They have also appreciated the researcher's efforts in designing the same for the teachers. Principals were satisfied with the furniture testing done in the classroom setting.