CHAPTER – 4

ANALYSIS OF DATA

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4.0 INTRODUCTION:

"Analysis is the ordering – the breaking down of data into constituent parts in order to obtain answers to research questions". –

F.N.Kerlinger

To facilitate analysis of questions in depth, all the questions of the interview schedule were grouped into four sections viz. –

1. Question for warming up the students.
2. Question based on knowledge of concepts.
3. Questions based on understanding of concepts.
4. Questions based on reflective (creative) thinking of concepts.

Findings and interpretation of the present study have been presented in this chapter.

Objective – 1: To study conception of class IV, V and VI students about the Moon and the Sun.

Objective – 2: To study the effect of intervention on the students' conception about the Moon and the Sun.

4.1 ANALYSIS OF RESPONSES OF QUESTIONS BASED ON KNOWLEDGE OF THE CONCEPTS.

A perusal of question of "Interview Schedule" shows that question No. 6,12,13, 20, 28, 29, 30, 31 and 40 fall under the section of knowledge of the concepts under study. Item wise analysis is given below :

Table: 4.1: Responses of Students on Knowledge Based Items Before & After The Intervention.

Item No.	PRE-INSTRUCTION												POST-INSTRUCTION											
	IV			V			VI			TOTAL			IV			V			VI			TOTAL		
	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR
4	5	1	0	4	2	0	4	2	0	13	5	0	6	0	0	5	1	0	5	1	0	16	2	0
8	3	3	0	5	1	0	3	3	0	11	7	0	6	0	0	6	0	0	6	0	0	18	0	0
9	4	2	0	1	5	0	3	3	0	8	10	0	5	1	0	6	0	0	6	0	0	17	1	0
14	0	1	5	0	0	6	0	5	1	0	6	12	5	1	0	3	1	2	4	1	1	12	3	3
19	3	3	0	0	6	0	4	2	0	7	11	0	5	1	0	3	3	0	5	1	0	13	5	0
20	0	2	4	0	3	3	1	3	2	1	8	9	4	0	2	3	0	3	4	1	1	11	1	6
21	2	4	0	1	5	0	4	2	0	7	11	0	6	0	0	5	1	0	5	1	0	16	2	0
23	0	6	0	0	4	2	0	4	2	0	14	4	0	6	0	0	5	1	1	5	0	1	16	1
28	1	0	5	0	1	5	0	3	3	1	4	13	2	0	4	2	2	2	4	0	2	8	2	8

R = Right Response, W= Wrong Response, NR = No Response

4.1.1 **Item No. 4** *Moon is –*

(a) Planet *(b) Satellite*

(c) Star *(d) None of these*

Table 4.1 reveals that in question No. 4 prior to instruction 5 students of class IV, 4 students of class V and 4 students of class VI responded correctly. Whereas one student in class IV, 2 students in class V and 2 students in class VI could not respond the question correctly. This shows that there is no relationship of right and wrong responses to this question with class. But more deep study is required to come to the conclusion.

If we look at the responses of students after instruction, it is clear that 6 students of class IV, 5 students of class V and 5 students of class VI responded the question correctly. Whereas no student of class IV, one each student of class V and VI responded the question wrongly.

4.1.2 Item No. 8: *When full Moon appears in the sky, what is it call ?*

Before instruction 3 students of class IV, 5 students of class V and 3 students of class VI responded correctly while 3 students of class IV, one student of class V and 3 students of class VI could not respond correctly to this question.

If we look at the responses of students after instruction, it is clear that all the 18 students of class IV, V and VI responded correctly. It shows

that instruction produces positive effect on the right responses of this question.

4.1.3 Item No. 9: *When Moon does not appear in the sky, what is it called?*

From table it is clear that frequency of pre-instructional right responses regarding this question of class IV is 4, class V is 1 and class VI is 3 and of frequency of wrong responses of class IV is 2 class , class V is 5 and class VI is 3.

Post instructional responses reveal that 5 students of class IV, 6 students each in class V and VI responded correctly and one student of class IV, no student of class V and class VI responded wrongly.

It is clear from table that there is great improvement in right responses after instruction of class V and class VI.

4.1.4 Item No. 14: *What do you mean by Lunar Eclipse?*

In question No. 14, prior to instruction none of the student of class IV, V and VI responded correctly, whereas one student of class IV and 5 students of class VI responded wrongly while 5 students of class IV, 6 students of class V and 1 student of class VI could not respond the question. It was observed that we are careless about natural phenomenon.

From post-instruction responses 3 students of class V and 4 students of class VI responded correctly while one student each in class

IV, V and VI responded wrongly whereas 2 students of class V, one student of class VI could not respond the question even after the instruction.

4.1.5 Item No. 19: *Sun is –*

(a) Planet *(b) Satellite*

(c) Star *(d) None of these*

In item No. 19 prior to instruction 3 students of class IV, no student of class V and 4 students of class VI responded correctly. Whereas 3 students in class IV, 6 students in class V and 2 students in class VI could not respond the question correctly.

If we look at the responses of students after instruction, it is clear that 5 students of class IV, 3 students of class V and 5 students of class VI responded the question correctly while one student of class IV, 3 students of class V and one student of class VI still could not respond the question correctly.

As compared to the Moon, the Sun is difficult to the students. They have more knowledge about the Moon.

4.1.6 Item No. 20: *What are Stars?*

Only one student of class VI gave correct response to this question and no student of class IV and V responded correctly before the instruction. Two students, 3 students and 3 students of class IV, V and VI

respectively responded wrongly whereas 4 students of class IV, 3 students of class V and 2 students of class VI did not give any response to this question prior to the instruction.

Post instructional position of responses to this question is as under 4 students of class IV, 3 students of class V and 4 students of class VI responded correctly. No student of class IV and V and one student of class VI gave wrong response while 2 students of class IV, 3 students of class V and one student of class VI even after the instruction could not respond.

4.1.7 Item No. 21: *Is the Sun Star?*

From table it is clear that 2 students of class IV, one student of class V and 4 students of class VI gave right responses while 4 students of class IV, 5 students of class V and 2 students of class VI gave wrong responses before the instruction. Remaining were wrongly responded.

If we examine the post instructional responses we can see that all 6 students class IV and 5 students each of class V and VI out of six students responded correctly.

4.1.8 Item No. 23: *By which thing the Sun is made of?*

By analyzing the pre-instructional responses we can see that no student of class IV, V and VI gave correct response but all 6 students of class IV, 4 students of class V and 4 students of class VI responded wrongly and 2 students each of class V and VI did not give any response.

Even after the instruction has been given no student of class IV and V can given correct response but only one student of class VI responded correctly whereas 6 students of class IV, 5 students of class V as well as class VI responded wrongly. one student of class V could not response this question even after instruction.

4.1.9 Item No. 28: *What do you understand by Solar Eclipse?*

Prior to instruction 1 student of class IV was right and no student of class V and VI gave right answer to this question. No student of class IV, one student of class V and 3 students of class VI responded wrongly whereas 5 students each in class IV and V and 3 students of class VI could not respond.

If we look at the responses of students after instruction, it is clear that 2 students each in class IV and V and 4 students in class VI responded the question correctly whereas 0,2 and 0 students of class IV, V and VI respectively responded the question wrongly. And 4, 2 and 2 students of class IV, V and VI respectively could not respond the question.

If we look at the table 4.1 for total responses, irrespective of class of individual item we find that there was tremendous increase in right responses after instruction. Hence there was great effect of instruction on this section of questions. Specially, for item No. 3,7,15 and 29. Item No. 6,26 and 30 were well known to the students because there was 100% right responses even before the instruction. It show that day-to-day

observations some times plays an important role in making scientifically consistent concepts.

4.2 ANALYSIS OF RESPONSES OF QUESTIONS BASED ON UNDERSTANDING OF THE CONCEPTS:

After deep thinking over the questions of the "Interview Schedule" researcher came to conclusion that item (question) No. 3,6,7,10,15, 17, 26, 29 and 30 fall under the section of the understanding of concept. Item wise analysis of students' responses is given below:

4.2.1 Item No. 3: *Write the Sun, the Moon and the Earth in the increasing order of their size.*

Responses of pre-instruction show (table 4.2) that no student of class IV, V an VI responded correctly and all 18 student of class IV, V and VI responded wrongly.

Post instructional analysis shows that all 18 students (6 students in each class) of class IV, V and VI gave right response that means the instruction is quite effective as far as this question is concern.

Table: 4.2: Responses of Students on Understanding Based Items Before & After The Intervention.

Item No.	PRE-INSTRUCTION												POST-INSTRUCTION											
	IV			V			VI			TOTAL			IV			V			VI			TOTAL		
	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR
3	0	6	0	0	6	0	0	6	0	0	18	0	6	0	0	6	0	0	6	0	0	18	0	0
6	6	0	0	6	0	0	5	0	1	17	0	1	6	0	0	6	0	0	6	0	0	18	0	0
7	0	6	0	0	6	0	0	6	0	0	18	0	6	0	0	6	0	0	6	0	0	18	0	0
10	3	3	0	4	2	0	6	0	0	13	5	0	6	0	0	6	0	0	6	0	0	18	0	0
15	3	3	0	1	5	0	1	5	0	5	13	0	4	2	0	3	3	0	4	3	0	11	7	0
17	4	2	0	1	5	0	5	1	0	10	8	0	5	1	0	6	0	0	4	0	0	15	3	0
26	6	0	0	6	0	0	6	0	0	18	0	0	6	0	0	6	0	0	6	0	0	18	0	0
29	1	5	0	1	5	0	1	5	0	3	15	0	4	2	0	4	2	0	5	1	0	13	5	0
30	6	0	0	6	0	0	6	0	0	18	0	0	6	0	0	6	0	0	6	0	0	18	0	0

R = Right Response, W= Wrong Response, NR = No Response

4.2.2 Item No. 6: *Generally what shape of the Moon do you see?*

In question No.6 prior to instruction 6 students each of class IV and V and 5 students of class VI responded correctly. One student of class VI did not respond.

After instruction all students of class IV, V and VI responded correctly.

It reveals that day-to-day observation produces very great impact on the concept formation.

4.2.3 Item No.7: *How many phases the Moon has?*

For question No. 7 prior to instruction none of the 18 students of class IV, V and VI responded correctly and all gave wrong response.

After instruction all the students responded correctly.

4.2.4 Item No. 10: *Suppose today is Poornima then what will be the shape of the Moon after 3 days, 6 days, 9 days and 12 days? (arrange in order using model).*

If we see at the responses of students prior to the instruction, it is clear that 3 students of class IV, 4 students of class V and 6 students of class VI gave right responses while 3 students of class IV, 2 students of class V and no student of class VI responded wrongly. This shows that class wise understanding increases about the phase change of the Moon.

Responses after instruction depict that all 18 students of class IV, V and VI were right. It indicates that the instruction was effective.

4.2.5 Item No. 15: *From figure identify the Lunar Eclipse.* (App. - 2)

Before instruction 3 students of class IV, one student of class V and one student of class VI could correctly identify the lunar eclipse while 3 students of class IV, 5 students of class V and 5 students of class VI could not identify the figure of lunar eclipse.

Position of responses after instruction is that, 4 students each of class IV and VI and 3 students of class V could correctly respond the question and 2 students of class IV, 3 students of class V and 2 students of class VI could not identify the figure.

It shows that there is improvement in the correct responses after the instruction.

4.2.6 Item No. 17: *Is there any life on the Moon?*

In item No. 17, prior to instruction 4 students of class IV, one student of class V and 5 students of class VI responded correctly whereas 2 students of class IV, 5 students of class V and one student of class VI responded wrongly.

If we look at the responses of the students after instruction, it is clear that 5 students of class IV, 6 students of class V and 4 students of class VI responded the question correctly while one student class IV, no

student of class V and 2 students of class VI could not respond the question correctly.

4.2.7 Item No. 26: *Is there any life on the Sun?*

All 18 students responded the question correctly before and after the instruction. No wrong response was there.

4.2.8 Item No. 29: *Identify the Solar-Eclipse in the figure.* (App-2)

For this question prior to instruction one student of each class i.e. class IV, V and VI responded correctly and 5 students each in class IV, V and VI responded wrongly.

After instruction 4 students each in class IV and V and 5 students class VI correctly responded whereas 2 students each in class IV and V and one student in class VI responded wrongly.

4.2.9 Item No. 30: *In the following figure recognize the Sun the Moon and the Earth.* (See Appendix-3)

All 18 students were able to recognize even before the instruction.

Total response of individual item irrespective of class reveals that instruction produced great positive effect in reforming item No. 3,7 and 29. Item No. 6,26 and 30 were responded correctly by all the students even before the instruction. Item No. 15 was some what difficult for some

students because only 11 students could respond this question correctly even after instruction.

4.3 ANALYSIS OF RESPONSES OF QUESTIONS BASED ON REFLECTIVE (CREATIVE) THINKING OF THE CONCEPTS:

After discussion with the eminent persons, the researcher came to conclusion that in the "Interview Schedule" item (question) number 5,11,12,13,16,18,22, 24,25,27 and 31 are the questions in which students have to think creatively on the concepts. Below is given item wise analysis of responses of each question.

4.3.1 Item No. 5:

When reason was asked for the response – *"What is the Moon?"*, no student of class IV and V, and 4 students of class VI gave correct reason prior to instruction, while 2, 1 and zero responses respectively were wrong and 4, 5 and 2 students respectively could not give reason for their response.

If we analysis post instructional responses then we can see that 4 students each in class IV and VI and 2 students of class V responded correctly. One student of class IV, 4 student of class V and one student of class VI responded wrongly whereas one student each in class IV and VI could not give any response.

Table: 4.3: Responses of Students on Creativity Based Items Before & After The Intervention.

Item No.	PRE-INSTRUCTION												POST-INSTRUCTION											
	IV			V			VI			TOTAL			IV			V			VI			TOTAL		
	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR
5	0	2	4	0	1	5	4	0	2	4	3	11	4	1	1	2	4	0	4	1	1	10	6	2
11	0	2	4	0	1	5	0	3	3	0	6	12	0	4	2	0	5	1	3	2	1	3	11	4
12	1	4	1	0	4	2	2	2	2	3	10	5	6	0	0	4	1	1	6	0	0	16	1	1
13	0	3	3	0	4	2	1	3	2	1	10	7	2	1	3	3	1	2	5	0	1	10	2	6
16	1	4	1	4	1	1	2	2	2	7	7	4	3	2	1	3	2	1	2	2	2	8	6	4
18	0	3	3	0	5	1	0	4	2	0	12	6	2	3	1	4	1	1	4	1	1	10	5	3
22	2	0	4	3	2	1	3	0	3	8	2	8	3	2	1	3	2	1	4	0	2	10	4	4
24	0	5	1	0	5	1	0	5	1	0	15	3	0	5	1	5	1	0	3	1	2	8	7	3
25	5	0	1	3	1	2	5	0	1	13	1	4	5	0	1	5	0	1	4	0	2	14	0	4
27	5	0	1	5	0	1	6	0	0	16	0	2	5	0	1	5	0	1	6	0	0	16	0	2
31	0	6	0	0	5	1	0	4	2	0	15	3	6	0	0	5	1	0	5	0	1	16	1	1

R = Right Response, W= Wrong Response, NR = No Response

4.3.2 Item No. 11: *Some times the Moon appears full, some times half and some times less than that. Why?*

In this question prior to instruction no student responded correctly. Two students of class IV, one student of class V and 3 students of class VI responded wrongly whereas 4 students of class VI, 5 students of class V and 3 students could not respond to this question.

No improvement in right responses of class IV and class V has been seen even after instruction but 3 students of class VI could respond correctly. But the situation of no response has been reduced substantially. Now 2 students of class IV and one student each of class V and V could not respond. But the frequency of wrong responses has been increased. Four students of class IV, 5 students of class V and 2 students of class VI responded wrongly.

From above discussion we can say that this concept is tough for these classes. But by some special way of instruction we can teach this concept to VI class student.

4.3.3 Item No. 12: *Why the Moon glows (shines)?*

From table- 4.3 it is clear that prior to instruction only 1, 0 and 2 students of class IV, V and VI respectively could responded correctly while 4 students of class IV as well as class V and 2 students of class VI

responded wrongly whereas one student of class IV, 2 student of class V and 2 students from class VI could not respond the question.

Post instructional responses indicates that all 6 students each of class IV and VI were correct where as in class V 4 students of class V were right, one student was wrong and one student did not give response.

4.3.4 Item No. 13: *You have seen black spots on the Moon. Why these spots appear?*

Prior to instruction no student of class IV and V and only one student of class VI could respond correctly whereas 3,4 and 3 students of class IV, V and VI respectively responded wrongly and 3,2 and 2 students respectively could not respond the question.

But after instruction 2 students of class IV, 3 students of class V and 5 students of class VI responded correctly. One student each of class IV and V and no student of VI responded wrongly. While 3 students of class IV, 2 students of class V and one student of class VI could not respond.

This shows that as age increases, the right responses increase.

4.3.5 Item No. 16: *If the Moon would not be there, what would be the effect on human being?*

In question No. 16 prior to instruction one student of class IV, 4 students of class V and 2 students of class VI responded correctly. But 4

students of class IV, one student of class V and 2 students of class VI responded wrongly while one student each of class IV and V and 2 students of class VI did not respond the question.

If we look at the responses of students regarding this question after instruction, it is clear that 3,3 and 2 students of class IV, V and VI respectively gave right response. While 2 students in each class gave wrong response and one student each in class IV and V and 2 students of class VI gave no response.

From above it is clear that the frequency of right responses is increased in class IV. While there is not increase in class VI but in class IV the frequency is decreased by one it means that there is no more effect of instruction but class V students got confused by instruction.

4.3.6 Item No. 18:

While students were asked to give reason for the question *"Is there any life one the Moon?"* There responses were as follows:

Prior to instruction no student responded correctly while 5 students in each class gave wrong reason and one student in each class gave no response.

After instruction 2 students of class IV and 4 students each in class V and VI responded correctly. While one student in each class did not give any response.

4.3.7 Item No. 22: *Why the Sun appears large as compared to other starts?*

The table – 4.3 shows that prior to the instruction 2 students of class IV and 3 students each in class V and VI responded correctly. 2 students of class V responded wrongly. While 4 students of class IV, one student of class V and 3 students of class VI did not respond to the question.

After instruction 3 students each in class IV and V, and 4 students of class VI responded correctly while 2 students each in class IV and V responded wrongly and one student each in class IV and V and 2 students in class VI gave no response.

4.3.8 Item No. 24: *Why the Sun does not appears at night?*

Regarding this question before the instruction no student was right, 5 students in each class were wrong and one student in each class did not respond.

While looking at post instructional responses we can know that no student of class IV was right while 5 students of class V and 3 students of class VI were right. Five students of class IV, one student of each of class V and VI was wrong and one student of class IV and 2 students of class VI did not give any response.

4.3.9 Item No. 25: *If the Sun would not be there what would be the effect on human life?*

To this question following were the frequencies of responses –

In class IV and VI, 5 students were correctly responded and 3 students of class V were correct. While one student of class V was wrongly responded. Whereas one student of each of class IV and VI and 2 student of class V gave no response.

After the instruction 5 students each of class IV and V and 4 students of class VI gave correct response. No student was wrong but one student each of class IV and V and 2 students of class VI gave no response.

4.3.10 Item No. 27:

While subject were asked the reason of their response about the question *" Is there any life on the Sun? "* they responded as below:

Prior to instruction 5 students each in class IV and V and all 6 students of class VI were right and no student was wrong. While one student each of class IV and V gave no response.

Just similar results were found after the instruction in each class.

Hence there was no effect of instruction on this question.

4.3.11 Item No. 31: *Why the Sun shines more than the Moon?*

In question No. 31 prior to instruction no student was responded correctly. While 6 students of class IV, 5 students of class V and 4 students of class VI responded wrongly and one student of class V and 2 students of class VI did not give response.

After instruction 6 students of class IV, 5 students each of class V and VI was right while one student of class V was wrong and one student of class VI gave no response.

Total responses of individual item, irrespective of class, based on creativity shows (table 4.3) that no question could be responded correctly by all 18 students. But item No. 12,27 and 31 could be responded correctly by 16 students. And very less effect of instruction was seen on item No. 11, 16, 22, 25 and 27.

Over all view of the table 4.4 reveals that right responses prior to instruction of knowledge based questions decreased from class IV to class V and then increased in class VI. Similar results were found in post instructional responses.

Similarly, right responses, prior to instruction, of understanding based questions first decreased from class IV to class V and then increased in class VI. But the post-instruction responses were equal in all the classes.

Table: 4.4: Mean of Students' Responses Before & After The Intervention.

Category of Question	PRE-INSTRUCTION												POST-INSTRUCTION											
	IV			V			VI			TOTAL			IV			V			VI			TOTAL		
	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR	R	W	NR
Knowledge Based Question	2.00	2.44	1.56	1.22	3.00	1.78	2.11	3.00	0.89	5.33	8.44	4.23	4.33	1.00	0.67	3.67	1.44	0.89	4.44	1.11	0.44	12.44	3.55	2.00
Understanding based questions	3.22	2.78	0.00	2.78	3.33	0.00	3.22	2.56	0.11	9.22	8.67	0.11	5.44	0.56	0.00	5.44	0.56	0.00	5.44	0.56	0.00	16.32	1.68	0.00
Creativity based Question	1.27	2.64	2.09	1.36	2.64	2.00	2.09	2.09	1.81	4.72	7.37	5.90	3.27	1.64	1.09	3.55	1.64	0.82	4.18	0.64	1.18	11.00	3.92	3.09

R = Right Response, W= Wrong Response, NR = No Response

But responses of creativity base question were increased successively from class IV to class VI, prior to instruction as well as after instruction.

These results are similar to that to Kikas (1998) *".... younger pupils refer more frequently to everyday perceptible data and older ones more to knowledge taught in school"*. Abraham and Willianson (1994) also found difference in understanding of five chemistry concepts with respect to grade level.

If we look at the mean of responses irrespective of class for knowledge based questions it is clear that the mean of right responses had increased from 5.33 to 12.44, mean of wrong responses had decreased from 8.44 to 3.55 and mean of no responses had also decreased from 4.23 to 2.0.

For understanding based questions the mean of right responses had increased from 9.22 to 16.32, mean of wrong responses had decreased from 8.67 to 1.68 and mean of no responses had decreased from 0.11 to 0.0.

For creativity based questions the mean of right response increased from 4.72 to 11.0 mean of wrong responses had described from 7.37 to 3.92 and mean of no responses had also decreased from 5.9 to 3.09.

This further proves that there is a positive affect of instruction in increasing the mean of right response of all sections of question.

Objective:3: "To Identify misconceptions of the students about the Moon and the Sun".

4.4 MISCONCEPTIONS:

Following were class wise misconceptions of students about the Moon and the Sun before and after the instruction.

4.4.1 Item No. 3: *Write the Sun, the Moon and the Earth in the increasing order of their size.*

Class IV: Three students wrote following order –

Sun → Earth → Moon

Two students wrote following order –

Moon → Sun → Earth

One student wrote following order –

Earth → Moon → Sun

No misconception was found after intervention.

Class V: Four students responded the order as –

Sun → Moon → Earth

Two students responded the order as –

Sun → Moon → Earth

No misconception was there after intervention.

Class VI: Four students responded following order –

Sun → Earth → Moon

One student responded following order –

Earth → Moon → Sun

No misconception was found after intervention.

4.4.2 Item No. 4: *The moon is –*

(a) Planet *(b) Satellite*

(c) Star *(d) None of these*

Class IV:

One student responded that the Moon is a Star. Even after intervention one student responded that the Moon is a Star.

Class V:

Two students responded that the Moon is a planet. After intervention one student responded that the Moon is a Star.

Class VI:

Two students responded that the Moon is a planet. After intervention all students responded correctly i.e. no misconception was found.

4.4.3 Item No. 5:

When reason was asked for their response to the question – *"What is the Moon?"* Following misconceptions were found –

Class IV:

One student responded that it appears at night and gives light hence it is a satellite.

After intervention no misconception was found.

Class V:

One student responded that the Moon is a satellite because with the help of it we can see the programmes on T.V.

After intervention no wrong response was there.

Class VI:

No misconception was there regarding this question in this class.

4.4.4 Item No. 7: *How many phases the Moon has?*

Regarding the shape of the Moon following were the misconceptions.

Class IV:

No student could respond the correct number of the shape of Moon. They responded that the Moon has 7,2,5,10 phases.

After intervention no misconception was found.

Class V:

All students were responded wrongly. Five, Six, Three or Four were there responses. After intervention all were correct.

Class VI:

In class VI also all students had misconception. They responded that the Moon has 6,4,5 or 7 phases.

Post interventional responses shows that there was no misconception after instruction.

4.4.5 Item No. 8: *When full Moon appears in the Sky, What is it call?*

Class IV:

One student responded that "Id" would be the name of the Moon.

After intervention misconception was reformed by the student.

Class V:

One student responded that than we would call it "Moon".

After intervention no misconception was found.

Class VI:

No misconception regarding this question was found. But frequency of no response was high.

4.4.6 Item No. 9: *When Moon does not appear in the sky, What is it call?*

One student of class V told it Moon light (Chandni) and after instruction one student of class IV told that it is called Lunar Eclipse. Remaining were right.

4.4.7 Item No. 11: *Sometimes the Moon appears full, sometimes half and sometimes less than that why?*

Class IV:

Following were the misconcepts of the students of class IV –

- It knows how to change the phase.
- Earth comes in front of Moon and covers it.

After instruction misconception was – the Earth absorbs the light hence the moon changes its phase.

Class V:

Following was the misconception of V class students prior to instruction.

- There is a planet behind the Moon and it gradually covers the Moon.

After instruction misconception was – Earth comes in front of the Moon.

Class VI:

Following were the misconceptions –

- The Moon spins on its axis hence changes its phase.
- It hides slowly in the sky.

After instruction following were the misconceptions –

- Because it does not have its own light.
- The Earth covers it.

4.4.8 Item No. 12: *Why the Moon shines?*

Class wise misconceptions regarding this question were as follows:

Class IV:

- Two students told that it is of silver colour, white and clean hence shine.
- Because at night Sun is not there hence the Moon shines.
- Because the Moon is beautiful hence glows.

No misconception was there after instruction.

Class V:

- To give light at night.
- Because at night there is darkness hence the Moon shines.
- Because it rises after Sun set.

After instruction one student told –

- It shines by its own light.

Class VI:

- Because it has its own light hence shines.

After instruction, no misconception was there.

4.4.9 Item No. 13: *You have seen black spots on the Moon. Why these Spots appear?*

Class IV:

Prior to instruction no misconception was there. After instruction, one student responded that due to the pollution of atom bomb etc spots of the Moon appears.

Class V:

One student responded that "They are the spots of cloud". One student told "The Earth cast her shadow on Moon".

After intervention no misconception was found.

Class VI:

One student told "Due to black soil, the black spots appears".

No misconception was there after intervention.

4.4.10 Item No. 14: *What do you mean by Lunar-Eclipse?*

Class IV:

Only one student respond to this question and his response was "when the Moon comes in from of the Sun then Lunar Eclipse occurs".

After instruction one student told that when Moon comes between the Sun and the Earth.

Class V:

No student could respond to this question. After instruction one student told that when the Moon comes between the Sun and the Earth.

Class VI:

Following were the misconceptions before the instruction –

- When the Moon come between the Sun and Earth.
- When the Sun comes between the Moon and Earth.
- When the Moon comes in front of the Sun.
- When meteor comes before the Moon.

After instruction only one misconception was there and order told by the student was :

Sun → Moon → Earth

From the above it is clear that the students know that the lunar eclipse occurs when the Moon, Earth and Sun come in a line but they could not remember their position.

4.4.11 Item No. 16: *If the Moon would not be there, what would be the effect on human being?*

Class IV:

Following were the misconception prior to the instruction -

- Two students told that there would not be night.
- One student responded that we could not have cool air.
- One student responded that we could not get oxygen.

After instruction one student responded that there would be no night.

Class V:

Prior to instruction one student responded that we would have died.

After instruction one student told that the Sun would remain always and there would be no night.

Class VI:

One student responded that we could not see any thing at night. After instruction one student respond that the day would remain always.

4.4.13 Item No. 19: *What is Sun?*

Class IV:

Prior to instruction two students responded that the Sun is a planet.

After instruction one student responded that the Sun is a meteor.

Class V:

Before instruction four students responded that the Sun is a planet. After instruction two students responded that the Sun is planet and one told that the Sun is a meteor.

Class VI:

Before instruction one student responded that it is a satellite and one student told that it is a planet. After instruction one student responded that the Sun is a meteor.

4.4.14 Item No. 20: *What are stars?*

Class IV:

No misconception was there regarding this question in the students of this class.

Class V:

Prior to instruction one student responded that "Which has five corners are stars". One student responded "When men die their soul appears as stars". No misconception was there after intervention.

Class VI:

One student had misconcept that the stars are those heavenly bodies which are made from meteor. No misconception was there after instruction.

4.4.15 Item No. 22: *Why the Sun appears large as compared to other stars?*

Class IV:

No misconceptions are there even before the instruction.

Class V:

Two students responded that the Sun is the largest hence appears large. After instruction one student responded that the Sun is made of fire hence it is large.

Class VI:

No misconception was found in this class students' response.

4.4.16 Item No. 24: *Why the Sun does not appears at night?*

Class IV:

One student responded that it does not appear at night because then it rises in other countries. one student responded that at night the Moon comes. Two students responded that the Earth goes behind the Sun. .

After instruction two students responded that the Moon comes in front of the Sun and hence it disappears.

Class V:

Two students responded that the Sun hides behind the Moon. After instruction one student responded that the Moon comes in front of Sun.

Class VI:

One student prior to instruction as well as after instruction responded that the Sun goes behind the Moon.

4.4.17 Item No. 28: *What do you understand by Solar-eclipse?*

Class IV and V student had no misconception about this question. Most of them did not respond to this question. But among class VI students, one student told that any meteor comes behind the Sun and one student responded that the Earth comes in between the Sun and Moon.

4.4.18 Item no. 31: *Why the Sun shines more than the Moon?*

Class IV:

One student responded that in day time there already remain light. After instruction no misconception was there.

Class V:

One student responded that the Sun shines more because it gets the light of noon. One student responded that at night Sun hides behind the Moon. No misconception after the instruction.

Class VI:

No misconception was there even before the instruction.

From the above description, it is clear that the instruction produce positive effect on the concept modification. However, even after the instruction, some of the students continued to give the reasons that were scientifically inaccurate. These results are similar to that of Stahly, Krockoker and Shepardson (1999) *".... Students may continue to hold views that are inconsistent with the scientific view even after providing a view that is scientifically accurate".*