CHAPTER – 5

SUMMARY AND CONCLUSION

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5.0 INTRODUCTION:

Concepts are the building blocks for the structure of knowledge. Children entering school come with their own concepts about the things around them. These concepts are not always consistent. The science teaching can not be effective without the identification of these misconceptions or common errors. This identification is also essential for bridging the gap between learning that takes place in the class room and in the community or environment. The higher order objectives of science teaching can not be achieved without proper moulding of misconceptions after identification. It is, therefore, the moral responsibility of science teachers to give proper shape and orientation to these misconceptions.

Hence the problem arises to know the concepts of the students and to try to mould their misconcepts in a form that are accepted as correct by curriculum developers, text-book writers and teachers.

5.1 STATEMENT OF THE PROBLEM:

Problem undertaken for the present study has been stated as – **"Conception About the Moon and the Sun of Students Studying in Class IV,V and VI."**

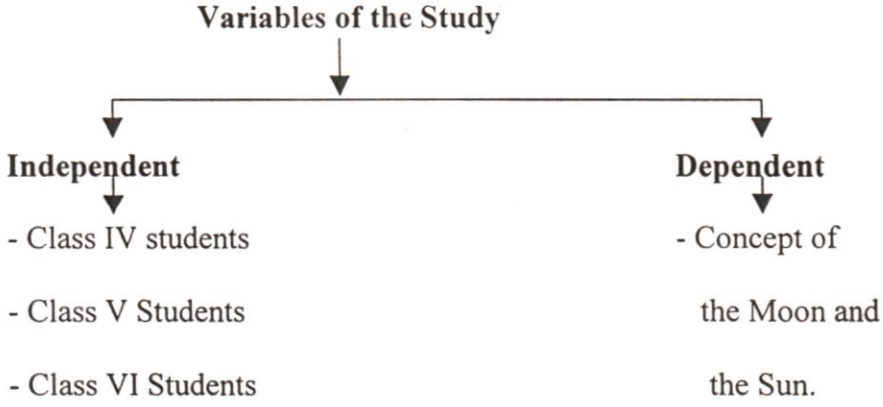
5.2 OBJECTIVES OF THE STUDY:

Following were the objectives of the study:

1. To study conception about the Moon and the Sun of students studying in class IV, V and VI.
2. To study the effect of intervention on the students' conception about the Moon and the Sun.
3. To identify misconceptions of the students about the Moon and the Sun.

5.3 VARIABLES OF THE STUDY:

The independent variable of the study were the classes in which the sample under investigation was studying. The sample has been selected from class IV, V and VI. The dependent variables were concept of the Moon and the Sun.



5.4 TOOL AND TECHNIQUE:

Keeping in view, the objectives of the study, structured interview schedule was prepared for assessing the conception about the Moon and the Sun of student. Data had been collected through interview technique.

5.5 SAMPLE:

The purposive sampling technique was used for selecting the sample. Eighteen bold students, having good interaction ability, studying in class IV, V and VI of Demonstration Multipurpose School (three boys and three girls from each grade) were selected.

5.6 DESIGN OF STUDY:

The design of the present study was experimental, in which pre-test and post-test design was adopted.

5.7 SCORING PROCEDURE:

Students' responses were analyzed and scored at three different level i.e. "right response", "wrong response" and "no response".

5.8 DELIMITATIONS:

1. The study has been confined to a sample drawn from Demonstration Multipurpose School (DMS), Bhopal.
2. The study was conducted on selected students of class IV, V and VI.
3. Only the concept of the Sun and the Moon had been investigated in this study.

4. Only those students were selected who had the interactive ability to participate in the study.

5.9 FINDINGS:

Item wise findings of present study were as follows:

5.9.1 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.

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.

5.9.2 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.

5.9.3 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.

5.9.5 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.

5.9.5 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.

5.9.6 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.

5.9.7 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.

5.9.8 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.

5.9.9 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.

5.9.10 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.

5.9.11 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.

5.9.12 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.

5.9.13 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.

5.9.14 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.

5.9.15 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.

5.9.16 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.

5.9.17 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.

5.9.18 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.

5.9.19 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 responsesthen 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.

5.9.20 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.

5.9.21 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.

5.9.22 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.

5.9.23 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.

5.9.24 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.

5.9.25 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.

5.9.26 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.

5.9.27 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.

5.9.28 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.

5.9.29 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.

5.9.30 Misconceptions:

Following were the misconceptions of students related to the concepts under study:

Class – IV:

- As far the size of the Sun, the Moon and the Earth is concern no student was correct. Most of the students told that the Earth is the biggest.
- According to one student the Moon is a star.
- All students were unaware of total number of phases of the Moon.
- "Poornima" was wrongly told as "Id" by one student. One student told "Lunar Eclipse" instead of "No Moon".
- Regarding the question "Why the Moon changes its phase?" One student responded that "it knows how to change the phase". One student responded that "the Earth comes in front of Moon and slowly covers it". Even after intervention one student told that

"the Earth absorbs the light of the Moon hence the Moon changes its phase.

- Two students responded that the Moon is of Silver colour, white and clean hence shines. One student responded that the Moon is beautiful hence shines.
- One student responded that the black spots on the Moon appears due to the pollution of atom bomb etc.
- Two students gave the reason for lunar eclipse that when the Moon comes in front of the Sun than lunar eclipse occurs.
- Two students responded that the Sun is a Planet. After instruction one student responded that the Sun is a meteor.
- Two students told that the Sun does not appear in the sky at night because then the Earth goes behind the Sun. After instruction two students responded that at night the Moon comes in front of the Sun hence it does not appears.

Class V:

- No student was able to respond the correct order of the size of the Sun, the Moon and the Earth. Four students told that the Moon is the biggest. Two students told that the Earth is biggest and the Sun is the smallest.
- According to two students the Moon is a planet.

- All students responded wrongly about the total number of phases of the Moon. They responded that 3 to 6 are the number of phases of the Moon.
- Two students responded that there is a planet behind the Moon and it gradually covers the Moon hence the Moon changes its phase.
- Regarding the question "Why the Moon shines?" One student responded that the Moon shines to give light at night. One student responded that the Moon shines because it rises after sun set.
- One student told that the spots on the Moon are due to black clouds. One student responded that the Earth casts her shadow on the Moon hence spots appears.
- One student responded that when the Moon comes between the Sun and the Earth then Lunar Eclipse occur.
- Four students responded that the Sun is planet and one student responded that the Sun is a satellite. After instruction two students responded that the Sun is planet and one student told that the Sun is a meteor.
- To the question "What are stars?" one student responded that the figures which have five corners are stars. To the same question one student responded that when men die their soul appears as stars.

- Two students responded that the Sun is the largest hence appears large as compared to other stars.
- Two students responded that the Sun hides behind the Moon hence does not appears in the sky at night.

Class VI:

- Four students responded that the Moon is the biggest and the Sun is the smallest.
- According to two students the Moon is a planet.
- No student was aware about the number of phases of the Moon. They responded that the Moon has either 4,5,6 or 7 phases. While the Moon has 16 phases in all.
- One student responded, regarding the question "Why the Moon changes its phase?", that the Moon spins on its axis. One student responded that it hides slowly in the sky hence changes its phase. After intervention two students responded that the Earth covers the Moon, hence changes its phase.
- One student responded that the Moon shines due to its own light.
- One student responded that due to black soil, black spots on the Moon appears.
- Two students responded that lunar eclipse occurs when the Moon comes between the Sun and the Earth. One student told that when the Sun comes between the Moon and Earth than Lunar eclipse

occur. One student responded that the Sun is a satellite and one student responded that it is a planet. After instruction on student responded that it is a meteor.

- One student responded that the Sun goes behind the Moon hence does not appears in the sky at night.

5.10 CONCLUSIONS:

Knowledge is a powerful tool. Positive values towards the science and social environment are key elements in changing behaviours of individuals. Findings of present study show that as children grow and progress they learn a tremendous number of new ideas from a variety of sources. Parents, teachers and books as well as television, radio contribute to children's complex understanding of natural phenomenon. Day-to-day observations also produce a great impact on it. Those concept may not be scientifically consistent. Instructions produce great effect on the concept modification. As the study depicts that some of the students had misconceptions even after the instruction, hence the age factor also plays a significant role.

5.11 EDUCATIONAL IMPLICATIONS:

- Knowledge, awareness and understanding should necessarily lead to action among students. Science is important in everyday life and the rote memorization of facts from text-books does not help.

- Teachers must provide a bridge between scientific knowledge and popular conceptions that can help to facilitate students understanding about environment.
- In class room some pictorial things and dramatization activities related to the concepts under study should be organized.
- Learners may be provided with a challenging situation – a situation which will bring to surface students' pre-conception.
- Students should allow to share their view with others and help them in their research for solution and do not provide "readymade" answers.
- As teacher, we should study the misconceptions held by the learners and provide appropriate examples, effective methods and time to remove those naive conceptions.
- As results of this study reflect that demonstration method is effective in concept reconstruction hence activity based method should be used for teaching difficult basic concept. Pachaury (1986) said *"Passive method lead to cognitive passivity and do not help in the development, refinement, extension and coordination of mental structure. Inquiry centred classroom experiences are essential for their progressive differentiation and consolidation"*.

- Teacher should find links between what the student knows and what he is required to learn.
- Idealized diagram should be prepared for better concept learning. According to Gagne (1970) *"The great value of concepts as means for thinking and communicating is the fact that they have concrete references. But concepts learned by the human being via language, there is often a danger of losing sight of this concreteness. These concepts are highly inadequate in their references to actual situations"*. Present study also find such type of results. Hence the laboratory and the demonstration methods have an important place in science teaching.
- We should respect the child's developmental nature. Hence science curriculum should be developed keeping in view three things – the developmental characteristics of the learner, the structure of science and its modes of inquiry.
- To make teaching-learning effective, the experiences provided should be related to day-to-day life.
- This type of study helps the teachers and curriculum constructor to analyze the structure of the concept and to demonstrate a methodology which teachers can use during teaching-learning process. It provides cues on what children know about a given

concept, which in turn forms the basis for preparing teaching plans or preparing learning materials etc.

- This type of study also opens the way for introducing concept of new content which related science to the daily observation around the child, and for bridging the gap between learning that takes place in classroom and in the community.
- The study also reflects on the relationship between classroom learning and social, cultural and natural milieu in which he lives.

5.12 SUGGESTIONS FOR FURTHER STUDY:

Due to time and circumstantial constraints the present study was delimited for knowing the concept of the Sun and the Moon only and for the 18 students of three classes (IV, V and VI) of Demonstration Multipurpose School, Bhopal. In order to generalize the findings of this study, some studies are suggested to establish the some fact to take up or a comprehensive study without delimiting the scope of investigation.

The following dissertation or research projects may be suggested for further study:

1. Replicating the study on the large sample.
2. The comparative study of rural and urban school students.
3. The comparative study of different school of same locality.
4. A study on same concept but with different tool.
5. Other concepts of students can also be studied.
6. A study of effect of different methods of intervention on concept formation.