CHAPTER-5
Findings, Suggestions and Conclusion

5.1 Findings:

Based on the analysis and interpretation in chapter 4, the findings are as follows:

Based on the first objective "To understand the overall nature of the student towards the science subject."

From the students response the findings are as follows:

1. It is found that 68% of the students like the science subject the most and 32% of the students do not like the science subject the most.
2. It is found that 44% of the students like the physics portion the most and 56% of the students do not like the physics portion the most. It is also found that 47% of the students like the chemistry portion the most and 53% of the students do not like the chemistry portion the most. It is also found that 57% of the students like the biology portion the most and 43% of the students do not like the biology portion the most.
3. It is found that 72% of the students believed that knowledge of the science subject is useful to them and 28% of the students do not believe that science subject is very much useful to them.
4. It is found that 63% of the students who complete their homework regularly and 28% of the students do not complete their homework regularly.
5. It is found that 49% of the students have a personal routine for study and 51% of the students do not have a personal routine for study.
6. It is found that 58% of the students have the average percentage of scores above 80% and 42% of the students have the average percentage of scores below 80% in class IX.

Based on the second objective "To identify the most difficult areas for the student in the science subject of class IX standard."

From the students response the findings are as follows:

1. It is found that 51% of the students clearly consider that science subject is easy to understand during classroom teaching and 49% of the students do not consider science subjects easy to understand during the classroom teaching.
2. It is found that 58% of the students clearly stated that "Structure of the atom" is comparatively the most difficult chapter in the chemistry portion. Whereas 31%, 8% and 3% of the students stated that "Atoms and Molecules, Is Matter around us and Matter in our surrounding" respectively are comparatively the most difficult chapter in the chemistry portion.
3. It is found that 79% of the students clearly stated that "Tissues" is comparatively the most difficult chapter in the biology portion. Whereas 12% and 9% of the students stated that "The Fundamental unit of life and Improvement in food Resources" respectively are comparatively the most difficult chapter in the biology portion.
4. It is found that 45% of the students clearly stated that "Gravitation" is comparatively the most difficult chapter in the physics portion. Whereas 24%, 12%, 12% and 7% of the students stated that "Work and Energy, Sound, Force & Laws of Motion and Motion" respectively are comparatively the most difficult chapter in the physics portion.
5. It is found that 54% of the students clearly stated that "Physics" is comparatively the most difficult portion in the science subject. Whereas 33% and 13% of the students

stated that “Chemistry and Biology” respectively are comparatively the most difficult portion in the science subject.

6. According to students the reason because of which they felt those chapters or portions most difficult are due to Incompetent teachers, Poor teaching strategy and skills, Dominantly lecture method based teaching, Impatient teacher, Poor explanation given, Poor way of concept visualisation and abstract concept given, Poor introduction of new concept, No smooth transition to a difficult or new concept, Insufficient time given for developing understanding in depth, Unclarity in prior knowledge, Lacking understanding and depth, Unable to connect with daily life and understand practical examples with interest, Understandable day to day life examples, Unrelatable and not able to relate mathematical portions in science real life, Unable to imagine the concept, Memorisation load, encouragement to rote learning and hard to remember, Lesser problem solving portion, Difficult diagrams, formula, numerical questions, chapter wordings, Sudden increase in difficulty and detailing level as compared to previous class, Poor teaching learning materials used, Uninteresting, Unenjoyment in learning, Lesser practice time given and Lesser concentration.

Based on the third objective “To identify the issues related to the teaching process used for those difficult chapters of class IX standard.”

From the students response the findings are as follows:

1. It is found that 42%, 41% and 48% of the students clearly agree that the teacher introduced open ended questions and promoted open ended discussion connecting their previous knowledge with the present learning experiences related to the most difficult physics, chemistry and biology chapters respectively. Whereas 58%, 59% and 52% of the students are either neutral or stated that the teacher did not introduce open ended questions and promoted open ended discussion connecting their previous knowledge with the present learning experiences related to the most difficult physics, chemistry and biology chapters respectively.
2. It is found that 49%, 50% and 53% of the students clearly agree that the open ended questions and discussion generated interest and curiosity to learn it related to the most difficult physics, chemistry and biology chapters respectively. Whereas 51%, 50% and 47% of the students are either neutral or stated that the open ended questions and discussion did not generate interest and curiosity to learn it related to the most difficult physics, chemistry and biology chapters respectively.
3. It is found that 49%, 47% and 56% of the students clearly agree that the teacher gave examples from their life experiences related to the most difficult physics, chemistry and biology chapters respectively. Whereas 51%, 53% and 52% of the students are either neutral or stated that the teacher did not give examples from their life experiences related to the most difficult physics, chemistry and biology chapters respectively.
4. It is found that 53%, 49% and 58% of the students clearly agree that the given example generated interest and curiosity related to the most difficult physics, chemistry and biology chapters respectively. Whereas 47%, 51% and 42% of the students are either neutral or stated that the given example did not generate interest and curiosity related to the most difficult physics, chemistry and biology chapters respectively.
5. It is found that 55%, 54% and 61% of the students clearly agree that the teacher helped to recall the previous knowledge related to the most difficult physics,

chemistry and biology chapters respectively. Whereas 45%, 46% and 39% of the students are either neutral or stated that the teacher did not help to recall the previous knowledge related to the most difficult physics, chemistry and biology chapters respectively.

6. It is found that 50%, 50% and 56% of the students clearly like the teacher's way of introducing and engaging us with the most difficult physics, chemistry and biology chapters respectively. Whereas 50%, 50% and 44% of the students are either neutral or did not like the teacher's way of introducing and engaging them with the most difficult physics, chemistry and biology chapters respectively.
7. It is found that 46%, 49% and 51% of the students clearly agree that the teacher facilitated discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively. Whereas 54%, 51% and 49% of the students are either neutral or stated that the teacher did not facilitate discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively.
8. It is found that 56%, 53% and 56% of the students clearly agree that the facilitated discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively generated further interest and curiosity to learn them. Whereas 44%, 47% and 44% of the students are either neutral or stated that the facilitated discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively did not generate further interest and curiosity to learn them.
9. It is found that 53%, 48% and 51% of the students clearly liked the overall teacher's way used to explore the concept and its related life experiences and examples related to the most difficult physics, chemistry and biology chapters respectively. Whereas 47%, 52% and 49% of the students are either neutral or they did not like the overall teacher's way used to explore the concept and its related life experiences and examples related to the most difficult physics, chemistry and biology chapters respectively.
10. It is found that 47%, 46% and 49% of the students clearly agree that the teacher allowed them to share their understanding developed from the discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively. Whereas 53%, 54% and 51% of the students are either neutral or stated that the teacher did not allow them to share their understanding developed from the discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively.
11. It is found that 52%, 53% and 57% of the students clearly agree that the teacher facilitated further understanding by providing further information sequentially based on the understanding developed from the discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively. Whereas 48%, 47% and 43% of the students are either neutral or stated that the teacher did not facilitate further understanding by providing further information sequentially based on the understanding developed from the discussion cum investigation of other real life examples and experiences related to the most difficult physics, chemistry and biology chapters respectively.
12. It is found that 54%, 52% and 58% of the students clearly agree that the teacher helped effectively to relate the newly learned concepts related to the most difficult

physics, chemistry and biology chapters respectively with the previously learned concepts . Whereas 46%, 48% and 42% of the students are either neutral or stated that the teacher did not help effectively to relate the newly learned concepts related to the most difficult physics, chemistry and biology chapters respectively with the previously learned concepts.

13. It is found that 51%, 53% and 60% of the students clearly agree that the teacher used easy to understand language for explaining the concepts related to the most difficult physics, chemistry and biology chapters respectively. Whereas 49%, 47% and 40% of the students are either neutral or stated that the teacher did not use easy to understand language for explaining the concepts related to the most difficult physics, chemistry and biology chapters respectively.
14. It is found that 50%, 55% and 59% of the students clearly agree that the teacher explained all the newly introduced terms properly related to the most difficult physics, chemistry and biology chapters respectively. Whereas 50%, 45% and 41% of the students are either neutral or stated that the teacher did not explain all the newly introduced terms properly related to the most difficult physics, chemistry and biology chapters respectively.
15. It is found that 37%, 39% and 45% of the students clearly agree that there were no gaps remaining in the explanation portion related to the most difficult physics, chemistry and biology chapters respectively. Whereas 63%, 61% and 55% of the students are either neutral or stated that there were gaps remaining in the explanation portion related to the most difficult physics, chemistry and biology chapters respectively.
16. It is found that 50%, 49% and 57% of the students clearly liked the overall teacher's approach to explain the concepts related to the most difficult physics, chemistry and biology chapters respectively. Whereas 50%, 51% and 43% of the students are either neutral or did not like the overall teacher's approach to explain the concepts related to the most difficult physics, chemistry and biology chapters respectively.
17. It is found that 52%, 47% and 54% of the students clearly agree that the teacher encouraged them to apply the learned concepts related to the most difficult physics, chemistry and biology chapters respectively in different real life contexts. Whereas 48%, 53% and 46% of the students are either neutral or stated that the teacher did not encourage them to apply the learned concepts related to the most difficult physics, chemistry and biology chapters respectively in different real life contexts.
18. It is found that 48%, 47% and 51% of the students clearly liked the overall teacher's approach to elaborate the topics further and its related life experiences and examples to solidify the understanding related to the most difficult physics, chemistry and biology chapters respectively. Whereas 52%, 53% and 49% of the students are either neutral or did not like the overall teacher's approach to elaborate the topics further and its related life experiences and examples to solidify the understanding related to the most difficult physics, chemistry and biology chapters respectively.
19. It is found that 49%, 53% and 55% of the students clearly agree that the teacher heard all the doubts related to the most difficult physics, chemistry and biology chapters respectively and responded effectively. Whereas 51%, 47% and 45% of the students are either neutral or stated that the teacher did not hear all the doubts related to the most difficult physics, chemistry and biology chapters respectively and responded effectively.
20. It is found that 53%, 49% and 54% of the students clearly agree that the teacher asked questions during and at the end of teaching related to the most difficult physics, chemistry and biology chapters respectively to check, identify, clear misconceptions

and enhance the understanding of students.. Whereas 47%, 51% and 46% of the students are either neutral or stated that the teacher did not ask questions during and at the end of teaching related to the most difficult physics, chemistry and biology chapters respectively to check, identify, clear misconceptions and enhance the understanding of students..

21. It is found that 46%, 47% and 49% of the students clearly agree that the teacher identified the difficult areas related to the most difficult physics, chemistry and biology chapters respectively. Whereas 54%, 53% and 51% of the students are either neutral or stated that the teacher did not identify the difficult areas related to the most difficult physics, chemistry and biology chapters respectively.
22. It is found that 50%, 52% and 49% of the students clearly agree that the teacher gave further emphasis, explanation and elaborated those difficult areas from the topics related to the most difficult physics, chemistry and biology chapters respectively. Whereas 50%, 48% and 51% of the students are either neutral or stated that the teacher did not give further emphasis, explanation and elaborated those difficult areas from the topics related to the most difficult physics, chemistry and biology chapters respectively.
23. It is found that 45%, 53% and 53% of the students clearly liked the overall teacher's approach to evaluate the student's understanding to enhance learning for concepts related to the most difficult physics, chemistry and biology chapters respectively. Whereas 55%, 47% and 47% of the students are either neutral or did not like the overall teacher's approach to evaluate the student's understanding to enhance learning for concepts related to the most difficult physics, chemistry and biology chapters respectively.
24. It is found that 52%, 56% and 58% of the students clearly liked the overall teaching process used for teaching concepts related to the most difficult physics, chemistry and biology chapters respectively. Whereas 48%, 44% and 42% of the students are either neutral or did not like the overall teaching process used for teaching concepts related to the most difficult physics, chemistry and biology chapters respectively.
25. According to students the teaching process can be more effective and interesting by having teaching learning based on Interactive activity based, Real world connections, Integrating all the senses of the students in learning, Breaking down complex topics, Emphasising on curiosity development, Focus on engagement, Promoting self learning, No confinement to classroom learning, Animation based, Greater discussion time, Focus on effective communication, By creating positive learning environment and encouragement of everyone, Making sure the concepts are experienced in a way by the teacher, By listening more to students and their problems, Fun based learning and addressing the issues and reasons for difficulty in learning the most difficult chapters or portions mentioned in the second objective above.

5.2 Suggestions:

The study would be incomplete if suggestions are not given for further improvement. On the basis of the findings of the present investigation, the investigator came out with important information which may be useful and guiding source for educators in framing effective strategies to overcome the learning difficulties of the students in science subjects.
Based on the findings, some of the suggestions necessary for increasing the likeness towards learning science subjects are as follows:

1. Students should be given prior knowledge effectively and playfully.
2. Engagement with the new concept should be dealt with based on the dynamic responses from students.
3. Student centred real life connections and examples should be made base for creating curiosity development.
4. Applications of the learned concept should be made interesting and relevant for students.
5. Greater scientific exposure should be given in their playful environment so that their aptitude develops for learning science.
6. More students choice activity based including fun elements should be incorporated.

Based on the findings, some of the suggestions necessary for overcoming the learning difficulties of the students in science subjects are as follows:

1. Greater emphasis on open ended questions and promoting open ended discussion connecting their previous knowledge with the present learning experiences to generate interest and curiosity.
2. Giving more examples from their life experiences related to the concepts before starting to teach them.
3. The teacher should help to recall the previous knowledge of the students.
4. The teacher should facilitate discussion cum investigation of other real life examples and experiences with greater effectiveness.
5. The teacher should allow more to share their understanding developed from the discussion cum investigation of other real life examples and experiences.
6. The teacher should facilitate more on understanding by providing further information sequentially based on the understanding developed from the discussion cum investigation of other real life examples and experiences.
7. The teacher should help effectively to relate the newly learned concepts of those chapters with the previously learned concepts.
8. The teacher should use easy to understand language for explaining the concepts.
9. The teacher should be aware that there are no gaps remaining in the explanation portion.
10. The teacher should encourage students to apply the learned concepts in different real life contexts with more effectiveness.
11. The teacher should hear all the doubts from students with more patience and a welcoming nature.
12. The teacher should always focus on identifying the present difficulties in learning by the students.
13. The teacher should be open to use various student friendly evaluation methods.

5.3 Conclusions:

In an increasingly complex world, students need a firm grasp of science in order to fully comprehend their world and make informed decisions. It is generally accepted that students learn best by doing – particularly in science courses. When students are engaged in "actively constructing knowledge from a combination of experience, interactions, interpretation and structured interaction with peers and teachers", they are more likely to gain an expert understanding of science concepts. Technology tools are one way to expose students to this type of learning.

Thus from the present study the investigator found that the complete learning of science depends on various factors. It is influenced by teaching approaches, students' prior scientific exposure and encouraging learning environment.

The teacher plays a crucial role in generating curiosity for learning and at the same time an ineffective teacher may make the students disinterested in learning. The present study shows that the teacher is not able to provide all the prior knowledge effectively and playfully, engagement with the new concept based on the dynamic responses from students, student centred real life connections and examples for creating curiosity development, applications of the learned concept to make it interesting and relevant for students, scientific exposure given in their playful environment so that their aptitude develops for learning science, more students choice based activities including fun elements incorporation.
Greater emphasis on open ended questions and promoting open ended discussion connecting their previous knowledge with the present learning experiences to generate interest and curiosity.

The teacher was not effective for all the students for giving more examples from their life experiences related to the concepts before starting to teach them, to recall the previous knowledge of the students, to facilitate discussion cum investigation of other real life examples and experiences with greater effectiveness, to allow more to share their understanding developed from the discussion cum investigation of other real life examples and experiences, to facilitate more on understanding by providing further information sequentially based on the understanding developed from the discussion cum investigation of other real life examples and experiences, to help effectively to relate the newly learned concepts of those chapters with the previously learned concepts, to use easy to understand language for explaining the concepts, to make sure that there are no gaps remaining in the explanation portion, to encourage students to apply the learned concepts in different real life contexts with more effectiveness, to hear all the doubts from students with more patience and a welcoming nature, to focus on identifying the present difficulties in learning by the students, to openly use various student friendly evaluation methods.