CHAPTER – V

FINDINGS AND CONCLUSION

5.0 Introduction:

The present study is designed to study the contribution of scientific attitude and scientific aptitude on the academic achievement in science subject of class X students. The previous chapter in this connection discussed the analysis and interpretation of data. It now becomes necessary to summarize the findings and conclusions resulting from the present investigation. Thus, the present chapter is devoted to this purpose under the following heads;

(i) Status of scientific attitude, scientific aptitude and the level of academic achievement in science of class X students.

(ii) Relationship between scientific attitude and academic achievement in science of class X students.

(iii) Relationship between scientific aptitude and academic achievement in science of class X students.

(iv) Multiple effect of scientific attitude and scientific aptitude on academic achievement in science of class X students.

(v) Effect of scientific attitude on the academic achievement in science of class X students.
(vi) Effect of scientific aptitude on the academic achievement in science of class X students.

(vii) Measures to improve the quality of science education in schools in East Khasi Hills District of Meghalaya.

5.1 Status of Scientific Attitude, Scientific Aptitude and the level of Academic Achievement in Science of class X Students in East Khasi Hills District of Meghalaya:

The research findings with regard to status of scientific attitude, scientific aptitude and the level of academic achievement in science of class X students in East Khasi Hills District of Meghalaya are as follows;

(a) Scientific Attitude

There is no student who has strongly favorable scientific attitude whereas 24.23% students have shown favorable attitude towards science subject. The maximum number i.e. 74.32% had neutral scientific attitude. This indicates that maximum number of students possess neutral scientific attitude which is neither towards favorable nor towards unfavorable.
(b) **Scientific Aptitude:**

The maximum number of students (i.e. 99.81%) possess low scientific aptitude. This indicates that almost all the students of the sample possess low scientific aptitude.

(c) **Academic Achievement in science.**

In a sample of 553 students, there were more low achievers (i.e.45.93%) than high achievers (i.e. 26.41%). However 27.66% students came under the category of medium achievers.

5.2 **Relationship between Scientific Attitude and Academic Achievement in Science of class X Students:**

There is a significant relationship between scientific attitude and academic achievement. It indicates that higher the scientific attitude of students higher will be their achievement in science. Similarly lower the scientific attitude of students, lower will be their achievement in science.

Binns (2012). Their studies confirmed the positive relationship between scientific attitude and achievement in science.

However, Kar (1990), James and Marice (2004) concluded that achievement in science and scientific attitude are not related.

5.3 Relationship between Scientific Aptitude and Academic Achievement in Science of class X Students:

There is a significant relationship between scientific aptitude and academic achievement. This shows that higher the scientific aptitude of the students higher will be their achievement in science. Similarly lower the scientific aptitude of students lower will be their achievement in science.


5.4 Multiple Effect of Scientific Attitude and Scientific Aptitude on Academic Achievement in science of class X Students:

The present study reveals that there is significant multiple correlation between academic achievement and the variables of scientific attitude and scientific aptitude taken together. This implies
that there is positive multiple effect of scientific attitude and scientific aptitude on academic achievement in science of class X students.


The researchers in their studies mentioned above confirmed that there is a significant multiple relation between academic achievement, scientific attitude and scientific aptitude. This shows that if the measures can be carried out to enhance scientific attitude and scientific aptitude among the students their respective achievement in science subject can be enhanced.

5.5 Effect of Scientific Attitude on the Academic Achievement in Science of Class X Students:

The findings indicate that high achievers score more on scientific attitude than low achievers. This implies that, higher the scientific attitude is more the achievement in science subject will be.


This can be concluded from the above mentioned results that all those students who have high level of scientific attitude show a generalized disposition towards science which can be measured in terms of its favorableness estimated from the scores obtained on Scientific Attitude Scale and their respective achievement scores in subject of science. Such students can understand scientific concepts easily, have more open mindedness, objectivity and curiosity towards scientific issues. By holding all these qualities it becomes easy for them to understand and learn the concepts of science subject and score high in examinations.
5.6 Effect of Scientific Aptitude on the Academic Achievement in Science of Class X Students:

The study reveals that there is a significant difference in scientific aptitude of students between high and low achievers in science subject. As this difference is in favor of high achievers of science subject it shows that high achievers possess high scientific aptitude as compared to low achievers. From this we can conclude that scientific aptitude influences the achievement in the science subject.


The above mentioned results help us in concluding that the students who have scored high in scientific aptitude test can comprehend the scientific knowledge in better way than those who have scored less. They hold more reasoning capability, have rich scientific vocabulary, higher numerical ability and have more information about scientific events. All this clubbed together helps
them to understand and comprehend subject of science easily in comparison to those who have less of scientific aptitude. This helps the students with higher scientific aptitude to achieve higher in subject of science.

5.7 Measures to Improve the Quality of Science Education in Schools in East Khasi Hills District of Meghalaya:

At the outset there is a requirement to make all schools well equipped with basic infrastructure including building and laboratories in order to enhance interest in science education. Learning of science is helpful in critical thinking and systematic organization and understanding. Thus teaching of science should not only enable learners to master the facts, concepts and principles of science or develop problem solving skills but also develop scientific attitude and scientific aptitude.

(i) Measures to Improve Quality of Science Education by Enhancing Scientific Attitude

Scientific attitude is the most important outcome of science teaching. Generally scientific attitude viewed as a byproduct of science teaching, yet it is also viewed equally as knowledge aspect. The following measures may be adopted to improve the quality of science education by enhancing scientific attitude.
(a) **Inquiry Based Learning**

Inquiry based learning at constant intervals play a vital role in maintaining science interest and thus developing scientific attitude. There is a need to include inquiry based learning since primary level of education so that knowledge and skills can be developed to enhance scientific attitude amongst students.

(b) **Use of ICT**

Use of ICT is another via media for enhancing scientific attitude and thus teaching learning phenomena in subject of science. There should be maximum use of computers, like smart class, digi class etc. Number of portals can also be developed for students and teachers separately and to be connected to regular class room teaching learning so that element of interest is alive and both students and teachers are motivated enough to take maximum benefit out of them.

(c) **In-Service Teacher Training in Science Teaching**

To enhance scientific attitude of students, it is a must that teachers should possess high scientific attitude. In-service teacher training science acquaintance programs and science related workshops play a vital role in preparing teachers to make science interesting to the students. This can help both students and teachers and shall yield into better achievement in science subject.
(d) **Use of Question Answer Techniques in Teaching**

To make the learning faster and for the longer retention, inquisitiveness should be kept alive amongst students. Use of question answer technique or inclusion of logical reasoning can help the students to learn better, otherwise studying science will only mean acceptance to dogma and will never lead to development of scientific attitude in learners.

(e) **Use of Science Laboratory**

Inclusion of practical learning will help students to make practical observations in science so that they get the opportunity to feel and develop the concepts. While learning, students should be provided with complete freedom (under supervision of teacher) to carry out their own devised experiences in a well equipped laboratory starting from the initial stages of learning science. Learning by doing proves to be the best method to learn with interest. This shall help them to interlink theory with experimentation. This shall not only help the students to enhance scientific attitude but also help for a long time retention.

(f) **Reading of Science Literature**

Science related literature like the biographies of scientists and details of discoveries in science incorporated in school curriculum play a vital role in developing scientific attitude among the learners. The
description of scientists’ pursuits their tenacity and perseverance are worth reading. The school libraries should be well equipped with such books which can provoke students to read more and enhance scientific attitude in them.

(g)  **Science Based Co-Curricular Activities**

Inclusion of science based co-curricular activities like model making, science projects, science exhibitions, science quiz and science debates etc. in syllabi can develop interest and attract students towards science subject.

(h)  **Class Room Culture**

There is a need to develop free interactive environment and space to open mindedness in class room culture, controlled and supervised by teacher. They should be provided such opportunities by which they can experience complete freedom in their thoughts. Teacher should never indulge in such practice by which students can get readymade responses for their queries.

(j)  **Science Clubs and Science Centers**

Well equipped science clubs in schools where students can learn innovation and interesting practical aspects of science shall help in developing and nurturing interest. There is a need to setup science centers and similar such bodies at local level to support and improve
quality of science education and spread the development of scientific culture. This shall keep keenness and interest for science alive amongst masses.

(k) **Science oriented excursions and outings**

Planned science oriented excursions and outings, to science related industries/institutes can be another step to develop interest in science amongst students. Such visits will make them know the practical ground utility of science and attach learning phenomena with vocation of their interest. This can help them to develop well defined abilities in cognitive and effective domains.

(ii) **Measures to improve Quality of Science Education by enhancing Scientific Aptitude.**

An individual with right inclination towards science develops better scientific aptitude which is very useful in selecting a career. Without good scientific aptitude an individual may not perform well in science. Scientific aptitude can be inculcated and enhanced for better achievement in science subject by adopting the following measures.

(a) **Science Competitions**

State Government may organize science talent search at state level. This will help in keeping the motivation level high amongst the
students to study science subject with keen interest and shall simultaneously help in developing scientific aptitude among them.

(b) **Science Oriented Recreation Programs/Games**

Inclusion of more of science oriented recreation programs/games for all age groups can play a vital role in developing scientific aptitude. This may help in developing natural scientific skills.

(c) **Logical Reasoning and problem solving**

Inclusion of logical reasoning and problem solving in science syllabi concerning to the topics, can help the students to sharpen their analytical power. This shall help them to take interest in the subject and learn better, otherwise studying science will never lead to development of scientific aptitude in learners.

(d) **Innovative Methods of Teaching Science**

There are number of methods of teaching science which student teachers learn but they remain confined to books only. Few of them which are very important for developing interest in learning in science are; lecture demonstration method, assignment method, analytic and synthetic method, inductive and deductive method, biographical method and heuristic method etc. These are few important methods which can be used in teaching science to develop scientific aptitude and can help in achievement in science subject to a great extent.
(e) **Hypotheses Formation**

Teacher should create class room atmosphere in such a manner which helps in imparting knowledge of scientific facts and scientific concepts in unusual and scientific manner. Teacher can encourage spirit of friendly criticism, hypotheses formation by asking various kinds of questions related to scientific concepts.

(f) **Creative and Critical Thinking**

Scientific aptitude can be developed by means of creative abilities which can be included in syllabi starting from primary level onwards. Teachers can develop these skills by asking unusual questions and make new connections. For example puzzle games, use of imagination to discuss an event or idea, generating questions and coming up with original views of content etc can help in developing mental acuity among the students.

(g) **Interactive Teaching**

Teacher should follow interactive teaching method in class room where students should have freedom to respond as per their level of understanding. Student’s responses can be accordingly corrected/modified by the teacher. This can help in developing open mindedness amongst students which is an important factor to develop scientific aptitude.
Scientific attitude and scientific aptitude are the mental faculties which if nurtured and enhanced help the students in many ways to develop a bonding with science subject. Both scientific attitude and scientific aptitude, though have different contents, are interrelated to each other. Support of administrative agencies looking after school administration/Government can play a vital role in enhancing both these qualities of mind and can enhance the interest level of students in subject of science. Diversion of funds, opening of more science based vocational opportunities and carrier avenues in North East can help pupils of this place to take keen interest in subject and opt for it with due interest.