

**ATTITUDE OF STUDENTS TOWARDS SCIENCE AT SECONDARY
LEVEL IN RURAL AND URBAN SCHOOLS OF JAMMU**



A

DISSERTATION

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CERTIFICATE

This is to certify that **Ms. Neha Kumari**, student of M.Ed. Semester IV, Session 2018-20, bearing Roll No. 1801019 has worked under my supervision for her dissertation entitled:

“ATTITUDE OF STUDENTS TOWARDS SCIENCE AT SECONDARY LEVEL IN RURAL AND URBAN SCHOOLS OF JAMMU. A COMPARATIVE STUDY”

Her dissertation is fit for submission in partial fulfillment of the requirement for the award of the Degree of Master of Education.

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[i]

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ABSTRACT

Education has always been regarded in India as a source of illumination and power. The target of every educational program is to ensure that the students achieve a satisfactory outcome. The present study was carried out to compare the Students attitudes towards science in selected rural and urban schools of Jammu city at the secondary level. Data was collected from 200 students studying science at the secondary level in four Rural and Urban schools of Jammu. To assess the student's attitudes towards science a tool developed by Dr. Savita Mishra was used. The Results shows that it is a reliable and valid tool for assessing attitudes towards science in Indian schools at the secondary level. This means that students in both the areas rural and urban have generally a positive attitude towards science. They think that the process of inquiry developed through the study of science and are also ready to adopt a scientific attitude. The results also shows that students tend to enjoy lessons in science and are interested in science related activities. Students have generally expressed a desire to pursue a career in science. The results also shows the gender differences occur in female students i.e. Adoption of scientific attitude scale. It means that the female students are more interested in adopting a scientific attitude as compared to male students. Finally, this research reports on the comparison in attitudes of students towards science at secondary level in rural and urban schools of Jammu. Results shows that on four out of five scales of tool attitude towards science there is significant differences in science related Attitudes between rural and urban schools. These are social implications of science, Attitude of Scientific inquiry, adoption of Scientific attitude, Enjoyment of science lessons, leisure interest in science and career interest in science scales. The Value of the mean scores of the urban schools in all scales is found to be higher. This suggests that students of urban schools possess a positive attitude towards science as compared to rural schools students. They enjoy science and are ready to pursue their career in science as compared to the rural school students. The Results also show that the students of the urban schools are more curious to learn new things in science.

CHAPTER – I
INTRODUCTION

CHAPTER-I

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Everyone needs an education in science in order to understand the world and to be a good citizen and good worker. Scientists, leaders in government, industrialists and the public in general need to be able understand scientific problems and to make good judgments about them. we need scientifically literate and informed people to make decisions about such things as health problems , environmental and pollution problems, such as air and water pollution , diseases such as cancer or tuberculosis and epidemics, or the possible effects of chemical pesticides upon us and our environment. (Gupta, 2007)

Science as defined by John Woodburn and E.O Bourn as :-

“Science is that human Endeavour tat seeks to describe with ever increasing accuracy, the events and circumstances that occur or exist within our natural environment.”

Science has been considered a major vehicle for enhancing the quality of human life. J.D Bernal argues in place of science in society that the effectiveness of any scheme of scientific education is shown by the place science takes in everyday of any scheme of scientific education is shown by the place science takes in everyday life. To achieve such universality, the place of science education in the early years of schooling has not been received due attention as it requires. This discipline as a matter of fact is under fire, both in developed and developing countries for different reasons (Rajput, 2000)

In developing countries, the teaching of science is linked more with the exploitation of natural resources i.e. economic development, while in developed

countries, the emphasis has been rather on idea generated due to rapid advancement in science education. It is precisely due to its progressive and critical nature, it has always been the prime focus on agenda of various committees and commission (Jain, 2004)

Science education research includes selection, legitimation and educational reconstruction of topics to be learned, selection and justification of general aims of teaching and learning science, as well as instructional sequencing that takes the learners cognitive, affective and social preconditions into account. Science education research has played essential roles not only in analyzing the actual state of scientific literacy and the actual practice in schools but also in improving instructional practice and teacher education (Dot, 2006)

Science education aim at increasing common knowledge about science and widening social awareness of scientific findings and issues. Learning science requires its language, which often differs from daily language. Learning science goes beyond scientific facts, principles and theories. One of its aims is to attain conceptual understanding of science. Today's science intends to produce citizens who can deal with the words, concepts and scientific symbols necessary for the technologically advanced modern age (Gafoor and Akhilesh, 2008).

The modern notion of science as a special kind of knowledge about the world practiced by a distinct group and pursued through a unique method was essentially in place. It used to give legitimacy to a variety of fields through such titles as "scientific" medicine, engineering advertising or motherhood. Over the 20th century links between science and technology also grew increasingly strong. The term Science refers to the organized body of knowledge concerning the physical world, both animate and inanimate, but a proper definition would also

have to include the attitudes and methods through which this body of knowledge formed; thus, a science is both a particular kind of activity and also the results of that activity.

Science occupies an important place in school curriculum. It is ironic that science education in the early years of schooling has not received due attention as it requires. Scientific and Technological knowledge is necessary component in education of pupils towards future of third millennium. Science and Technology are connected to each other and are mutually inspiring. Education must emphasize the interaction between science, technology, society and environment by focusing on design process (Roth, 2001). During the last 20 years this approach has been implemented across the world and it is known as Science-Technology Society (STS). Science is universal and we are in a crucial stage in the progress of development and transformation. In this context, the role of Science is of utmost importance. Science education being an important component of the education system should contribute to the solution of the problems of the country by developing desirable understanding of skills, attitudes and values. “Science in fact is more than a subject: it is a method of acquiring knowledge”

The term “Science” (Scientia) is etymologically synonymous with knowledge, which of course does not imply that all knowledge is Science. In the literal sense, science means the pursuit of knowledge, but it has a wider connotation for our purpose and can be said to mean knowledge of nature in the widest possible form. Report of the National Education Commission (1964-66) has remarked “There is of course one thing about which we feel no doubt or hesitation: education, Science based and in coherence with Indian culture and values can alone provide the foundation and also the instrument for nation’s

progress, security and welfare.” Science is one of those human activities that man has created to gratify certain human needs and desires. Curiosity has been the greatest motive power of scientific research. The “Search of Truth” becomes the dominant motive in the prosecution of science. It has been persuaded for so many centuries and attracted ever wider extent of attention of a much persisted group of people.

Science is a subject which has revolutionized all walks of life. Some students take interest and some students feel boredom while studying science. The attitude of students differ at different levels especially at secondary level. The attitude towards science or scientific attitude may be operationally taken as the generalized attitude towards science, content of which is being measured in terms of its favourableness or unfavourableness. Apart (1935) opined that the attitude towards science refers to the feelings, opinion, beliefs in and indirectly with various aspect of the scientific enterprise and which exerts a direct influence on their behaviours towards science (Ahamed, Raheem & Hassan,2003)

Keeves (1992) asserted that attitude towards science are known to decrease as students progress through their schooling years. He further submitted that attributes such as enthusiasm, respect for students and personality traits have been shown to influence Students attitude towards science as well as in other subjects. The implication of Keeves findings is that attention should be given to science teaching early so as to enable students to have favourable disposition towards science later in life.

Definitions

Burnie (2007) defines, “science as the systematic study of anything that can be examined, tested and verified”.

Science is defined as the observation, identification, description, experimental investigation and theoretical explanation of natural phenomena. Science is the study of the nature and behaviour of natural things and the knowledge that we obtain about them.

From the above definition we can say that Science is a skill which enables the students to think scientifically by applying problem solving techniques to science lessons, Using creative ideas to teach science processes like observing, classifying, predicting and inferring will help the students discover scientific attitude. In the present study science is the subject.

Operational definition:

According to Gardner, “Scientific attitude is the desire to know and understand, questioning to all statements, search for data and their meaning, search for verification and consideration of consequences.”

In this study “**Attitude**” refers the affinity towards the positive and negative sides of behaviour related to Science subject.

In this research, the attitude refers to the feelings, opinion, beliefs in and about appreciation that forms as a result of interacting directly or indirectly with various aspects of the scientific enterprise and which exerts a direct influence on their behaviors towards science.

Science education research includes selection, legitimating and educational reconstruction of topics to be learned, selection and justification of general aims of teaching and learning science, as well as, instructional sequencing that takes

the learners cognitive, affective and social preconditions into account. Science education research has played essential roles not only in analyzing the actual state of scientific literacy and the actual practice in schools but also in improving instructional practice and teacher education (Dutt,2006)

1.2 RESEARCH OBJECTIVES

The objectives of the proposed research study are:

1. To assess the students attitude towards science at the secondary level.
2. To compare the students attitude towards science at the secondary level in rural and urban schools of Jammu
3. To investigate whether gender differences occur in students attitude towards science.

1.3 RESEARCH HYPOTHESES

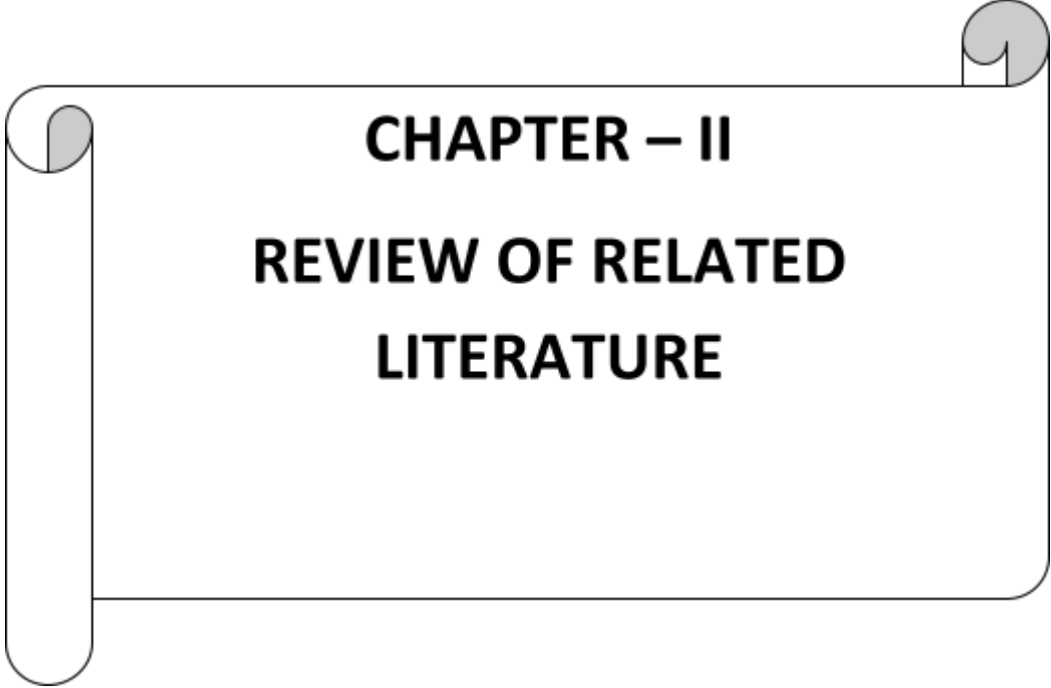
The hypotheses of the proposed research study are:

1. There is positive students attitude towards science at secondary level.
2. There is no significant difference in the attitude of students at secondary level in rural and urban of Jammu.
3. There is no significant gender differences in students attitude towards Science.

1.4 DELIMITATIONS OF STUDY

1. The study has been delimited to students of a few rural and urban schools of Jammu.

2. The study has been restricted to 200 students and that to at the secondary level only.
3. The study was only quantitative in nature.
4. The study has been delimited to one tool only Attitude towards science scale developed by Dr. Savita Mishra.



CHAPTER – II

REVIEW OF RELATED LITERATURE

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

Brog (1997) stated that the literature in any field forms foundation upon which all the future works will build. Study of related literature implies, locating, reciting, and evaluating reports of the casual observation and opinion that are related to individuals planned research project. A researcher takes the advantage of the knowledge, which has accumulated in the past as a result of constant endeavour. Research can never be undertaken in isolation of the work that has already been done on the problems which are directly or indirectly related to a study proposed by a researcher. One of the important steps in the planning of any research study is a careful review of the research journals, books, dissertations, theses and other sources of information on the problem to be investigated. Therefore, a review of the related literature must precede any well planned research study. Review of related literature is an important part of any research work. It helps the investigator gain better perspective of the problem. All available literature concerning the problem at hand were surveyed and examined by the investigator. Researcher will help the investigator for furtherance of knowledge related to the problem. A researcher takes the advantage of the knowledge which has accumulated in the past as a result of constant human Endeavour.

“The keys to the vast store house of published literature may open doors to sources of significant problems and exploratory hypotheses and provide helpful orientation for definition of the problem, background for selection of procedure and comparative data for interpretation of results. In order to be creative and original, one must read extensively and critically as a stimulus to thinking.” The review of literature gives information about the various studies done in the attitude of students towards Science. The present chapter provides information regarding the research studies done in the field of science education and acquaint with the related literature on science classroom learning environment to get up to date knowledge on the work which others have done.

2.2 RESEARCH ON SCIENCE EDUCATION IN INDIA

Science and Religion both describe the way things are and both refer to the source of authority behind ‘truth’. Personal beliefs about science and religion can affect attitudes towards science and the learning of science. These beliefs are not domain dependent and are less likely to be affected by an increased emphasis on the nature of science in school curriculum. This study was designed to examine the impact of participating in an after-school robotics competition on high school students' attitudes toward science. Specifically, this study used the Test of Science-Related Attitude to measure students' social implications of science, normality of scientists, attitude toward scientific inquiry, adoption of scientific attitudes, enjoyment of science lessons, leisure interest in science, and career interest in science. Results indicated that students who participated in a robotic competition had a more positive attitude toward science and science-related areas in four of the seven categories examined: social implications of science, normality of scientists, attitude toward scientific inquiry, and adoption of scientific attitudes. Implications of results on students' attitudes are discussed.

Anwer and Iqbal (2012) studied the Students Attitude towards Science: A Case of Pakistan.

This study was conducted to examine Students attitude towards science. The sample of the study consisted of 3526 students of 10th grade (Boys = 1914, Girls = 1612) and were from urban ($n = 2304$) and rural ($n = 1222$) localities of Pakistan. The instrument administered was 'Test of Science Related Attitude' (TOSRA) developed by Fraser (1981). Results of the study depicted a significant effect of gender and locale on students' attitude towards science. Girls had significantly higher attitude towards science than boys on total scale and on all sub-scales of TOSRA with only one exception of Career Interest in Science subscale on which boys were slightly higher than girls but it was not significant. Locality wise results showed rural students to score significantly higher on the total scale and on the subscales of Social Implication and Career Interest in Science than the urban respondents, while the urban respondents scored significantly higher on the subscale of Adoption of Scientific Attitude than the rural respondents. There was no significant variation between the rural and urban respondents in their Attitude towards Scientific Inquiry, Enjoyment of Science Lessons and Leisure Interest in Science. This study has wide implications for educationists.

Gautreau and Binns (2012) investigated students attitudes towards science and content achievements in three secondary biology classrooms using an environmentally place based curriculum as well as traditional curriculum and found that inquiry based academic class achieving the latest gain in scientific attitude of learners towards science.

Mukhopadhyay (2013) carried out a study in Calcutta and concluded that there are several factors which influence science learning; among which their scientific attitude is a major determiner. Scientific aptitude indicates the possibility of future success or failure in the area of science learning. n their achievement level.

Osborne, Simon and Collins (2013) studied that the attitudes towards science and its implications over the past 20 years. It argues that the continuing decline in numbers choosing to study science at the point of choice requires a research focus on students' attitudes to science if the nature of the problem is to be understood and remediated. Starting from a consideration of what is meant by attitudes to science, it considers the problems inherent to their measurement, what is known about students' attitudes towards science and the many factors of influence such as gender, teachers, curricula, cultural and other variables. The literature itself points to the crucial importance of gender and the quality of teaching. Given the importance of the latter argue that there is a greater need for research to identify those aspects of science teaching that make school science engaging for pupils. In particular, a growing body of research on motivation offers important pointers to the kind of classroom environment and activities that might raise pupils' interest in studying school science and a focus for future research.

Narmadha and Chamundeswari (2013) studied attitude towards learning of Science and academic achievement in Science among students at the secondary level, using random sampling technique 422 students, from the secondary level in different systems of education, namely, state, matriculation and central board schools were chosen. The Attitude toward Learning of Science Scale (Grewal, 1972) was used to assess the attitude towards learning Science and the marks scored in Science were taken from their half yearly performance. The data collected was subjected to statistical analysis, namely, mean, standard deviation, 't'-test, 'F'-ratio, Karl Pearson's Product Moment Correlation Co-efficient 'r'. Results showed that the students belonging to the central board schools have a higher level of attitude towards

learning of Science compared to students in state board but did not differ with students in matriculation board schools at the secondary level. Similarly, students belonging to central board schools performed better in Science subject compared to the students in state and matriculation board schools at the secondary level. The girls are significantly better in their attitude toward learning of Science when compared to the boys in all categories of schools. In matriculation and central board schools the girls are better than boys in their academic achievement in Science whereas in state board schools there is no significant difference in their gender. A positive correlation was found to exist between attitude towards learning Science and academic achievement in Science among the students.

Norah Frederickson (2014) made a study on twenty science attitude. This study was conducted to analyse the twenty science attitude among the teacher in high school at Calcutta city. In Calcutta city, the data were collected from 875 teachers. Multiple regression analysis and ANOVA were used for the analysis of data to find out the presence of science attitude among them. The result shows that the following twenty science attitude develops the responsibilities of an teacher Empiricism, Determinism, A belief that problems have solutions, Parsimony, Scientific manipulation, Skepticism, Precision, Respect for paradigms, A respect for power of theoretical structure, Willingness to change opinion, Loyalty to reality, Aversion to superstition and an automatic preference for scientific explanation, A thirst for knowledge, an "intellectual drive.", Suspended judgment Awareness of assumptions, Ability to separate fundamental concepts from the irrelevant or unimportant, Respect for quantification and appreciation of mathematics as a language of science, An appreciation of probability and statistics, An understanding that all knowledge has tolerance limits and Empathy for the human condition.

Shabbir Ali and Awan (2014) studied on Attitude towards science and its relationship with student's achievement in science. This study was conducted to examine the relationship of attitude of secondary school students towards science with the achievement in the subjects of Physics, Chemistry, Biology and Mathematics. TOSRA was used to measure students' attitude towards science and data was collected from 1,885 students of 10th grade. Simple correlation (r), Multiple regression analyses (R) and standardized regression coefficients were used to investigate the relationships between attitude towards science and achievement in science. The results of the study indicated that attitude towards science had significantly positive relationship with the achievement of science students at secondary level. The total number of students selected for the sample was 1,885 (998 male students and 887 female students). These students were selected from four districts (Okara, Faisalabad, Sargodha and Pakpattan) of Punjab province and they were studying science subjects at secondary level. The students' achievement in science was a dependent variable of the present study. The students of 10th grade public secondary schools had already appeared in 9th grade Board examinations. The 9th class Board results of these students in the subjects of Physics, Chemistry, Biology and Mathematics were used as achievement measures. Simple correlation analysis was used to describe the bivariate relationships between each individual achievement scale and each individual attitude scale, Multiple regression analyses were used to investigate the multivariate relationships between each achievement scale with the set of four attitude scales as a whole, the standardized regression coefficients (regression weights) were also examined to interpret the significant multiple correlation. It was concluded from the above discussion that Attitude to Scientific Inquiry, Classroom Enjoyment and Leisure Interest in Science are strong independent predictors of Physics achievement scores. Attitude to

independent predictors of Chemistry achievement scores. It was concluded from the above discussion that Classroom Enjoyment and Leisure Interest in Science was strong independent predictor of Biology achievement scores.

Calik, Ultay, Kotomve and Aytar (2015) investigated the effects of some variables (gender and year of study) on science student (SSTs) chemistry attitudes. An adapted version of Chemistry Attitudes and Experiences Questionnaire was administered to 983 SSTs drawn from four different universities in the region of Eastern Black Sea, Turkey. Significant differences between genders' mean scores of the CAEQ indicate that the females somewhat develop stronger positive attitudes towards chemistry than do the males. Furthermore, because the first year of the study generally had the highest mean scores of the three subscales of the CAEQ, it can be deduced that tertiary education lacks improving the SSTs' positive chemistry attitudes to a satisfied level and/or a large effect size. Hence, its attitudinal quality should be intimately inquired.

Zeidan, Hefez and Rashed (2015) studied to investigate the relationship between the Palestinian secondary school student's knowledge level of science process skills and their attitudes towards science, the effect of gender and residence of these students on their knowledge level of science process skills and on their attitudes towards science. The study used an 18-question science process skills test and a 25-item attitude towards science questionnaire. The association between knowledge level of science process skills and attitudes toward science were significant with a correlation coefficient of 0.69. The results of the study indicated that there were significant differences in science process skills due to gender favouring females; and due to residence favouring village's students. However, there were no significant differences in attitudes toward science due to the variables.

Breakwell and Beardsell (2016) studied the extent to which variance in science attitudes and involvement in science activities were attributable to gender, parental and peer influences upon 11-14 year olds in the UK. The data presented were derived from a sample of 391 pupils drawn at random, but stratified by age and gender, from Local Education Authority schools (i.e. schools within the state sector where parents make no direct payments for education). A self-completion questionnaire was administered to the pupils in school. Attitudes toward scientific change, involvement in scientific extra-curricular activity, liking and performance in school science subjects, and participation in peer youth culture were indexed, in addition to estimates of the amount of positive regard for science expressed by *peers and parents*. Boys had more positive attitudes to science and greater levels of participation in scientific extra-curricular activities. They also reported performing better at school science than girls. A positive attitude to science was strongly positively related to having a father and mother who support science, coming from a lower socio-economic family background, being male, and having scientific peers. Greater involvement in scientific extra-curricular activities was predicted by having a father who supports science, having parents who engage in activities jointly with their children, and having scientific peers.

Singh and Singh (2016) studied attitude of students towards science at secondary level. Science has brought about revolutionary changes in every walk of life studied by its impact is visible everywhere and in every aspect of our existence i.e. vocational, social, economic, political and cultural. Science attitude refers to an individual's outlook towards life. It means

willingness to adopt scientific approaches and Procedures for resolving issues/assessing ideas or information. Science attitude denotes interest or feeling towards studying science. The main objective of the study was to study the correlation between Scientific Attitude of class IX students. To obtain the above objective normative survey method has been used. 320 students were selected from government and private school for the study. The finding of the study reveals that there is high positive correlation (0.73) found between the Scientific Attitude and Scientific Interest of class IX students.

Aboud and Asiri (2017) investigated that the secondary school students' attitudes in Saudi Arabia towards science. Questionnaire of 24 items was developed considering a variety of attitudes toward science instruments, and then administrated to a sample of 150 secondary school students (78 males & 72 females). The findings indicated that secondary school students in Saudi Arabia have positive attitudes towards science. At the meantime, the results showed that there was no significant difference in attitudes towards science between males and females. These findings are discussed in the context of science teaching and research. In addition, the results suggest that further research is required to explore how Saudi students' positive attitudes towards science can be used to improve their performance in science.

Ajagbe, Micheal and Sakariyao(2017) investigated the attitudes of secondary school students towards science in Odeda Local Government Area of Ogun State, Nigeria. Two hundred senior secondary school students consisting of 84 males and 116 females were selected from five secondary schools using stratified random sampling techniques. A 20-item Attitude to Science Questionnaire on a five-point likert scale was adopted for the study. The instrument has a reliability coefficient of 0.73 using Cronbach's reliability method. Frequency counts and percentages were used to obtain an overall picture of students' attitude towards science while student's t-test was used to find out whether there was significance difference between the attitude of male and female students. Findings showed that a higher proportion of the students display positive attitude towards science. Also, there was no significant difference between the attitude of male and female students towards science. Keywords: Attitude, Science, Student, Secondary school.

Hofstein and Naaman (2017) studied positive attitudes towards science and interest in science in general and learning science in particular is one of the key fuelled many research studies, these being focused on: content, pedagogical, and curricular issues. In this paper we focused on the issue of enhancing attitude and interests in the context of chemistry learning mainly at the upper secondary level of schooling. The authors of this manuscript suggest that the three key factors that should be considered for enhancing attitudes and interests are the methods used to present the content (e.g. relevance, and historical approach), instructional techniques that are implanted, and gender issues. Although throughout the years we have learned a lot regarding teaching and learning of chemistry we are unable to provide conclusive recommendations regarding how in the context of chemistry education affective constrains could be enhanced. However, based on scholarly developments and research we suggest areas (see above) that should be considered by science (chemistry) educators, curriculum developers, and chemistry teachers who believe that developing positive attitudes one of the central goals.

Shirazi (2017) studied that the attitude of students towards science paper presents the findings of a two-phase mixed methods research study that explores the link between

experiences of school science of post-16 students and their decisions to take up science for their higher studies. In the first phase, students aged 13–15 ($n = 569$) reflected on the past five years of their school science experience in a quasi-longitudinal approach to determine a typology of experiences. The second phase entailed data collection through interviews of a sample of these students ($n = 55$) to help triangulate and extend findings from the first phase. Students taking up science post-16 reported significantly more positive experiences of school science than students who had decided not to take science further. Of school-related factors influencing experiences of school science curriculum content was the most important followed by being interested and motivated in the subject. There is evidence that interest and motivation in science depend on teacher practice and the perception of science as a difficult subject.

Wan and Lee (2017) studied attitudes towards science, under two researched areas on students that is, the structural models representing these attitudes and the role played by school bands in moderating the gender differences in such attitudes. The participants were 360 ninth graders in Hong Kong from 3 school bands. The structural equation modelling method was adopted to compare four hypothetical models for Students attitudes towards science. Results reflect that the data supported the three-factor structure of the behavioural domain of students' attitudes towards science; the four lower level dimensions of the attitudes towards science (i.e. value of science to society, self-concept in science, anxiety towards science and enjoyment of science) could be further integrated into broader categories, male students demonstrated significantly more positive attitudes towards science in five dimensions (i.e. self-concept in science, enjoyment in science, learning science in and outside the classroom and future participation) and school bands played a prominent moderating role in gender differences in students' attitudes towards science.

Hu, Friedrich, Leung and Gauveichen (2018) studied students attitude consistently achieved extraordinary science achievement, they demonstrated below-average attitudes towards science. It was unclear what the associations are among attitudes toward science, and influences from school, family, and student themselves. By analyzing a sample of 3600 fourth-graders from 132 Hong Kong schools, we found that the family- and student-related factors (book ownership, parent education, student gender and attitudes to school) had significant correlations with student attitudes toward science, but the school-related factors (school environment and teacher characteristics) did not show significant influence on students' science attitudes. These findings may shed light on what the influences that seem to play behind these high achieving students' relatively low attitudes in science.

Jamhari, Syarifuddin and Sipahutar (2018) studied the effects of science-related attitudes on students problem solving skills and the interactions between visual mapping and science-related attitudes on students problem solving skills was conducted at MAN 1 Tanjung Pura, with the samples of 141 students of XI-Science Program. This study was a quasi-experimental technique by using a pretest-posttest experimental group with 4x2 factorial designs. The technique of data analysis was processed by the Two-Way ANOVA and followed by Duncan's Multiple Range Test with the aid of SPSS 22.00 on the significance level of 0.05. The results showed that: there were the significant effects of visual mapping on students' problem solving skills ($F=94.214$; $P=0.000$), where the scores of students' problem solving skills taught by concept mapping (87.74 ± 2.586) were significantly higher than taught by direct instruction (78.84 ± 2.689), (2) there were the significant effects of science-related

attitudes on students' problem solving skills ($F=3.397$; $P=0.031$), where the scores of high science-related attitudes on students' problem solving skills taught by visual mapping (85.68 ± 4.312) were significantly higher than the scores of low science-related attitudes on students' problem solving skills taught by visual mapping (77.26 ± 3.614), and (3) there were the interactions between visual mapping and science-related attitudes on students' problem solving skills ($F=2.195$; $P=0.000$), where the scores of students' problem solving skills taught by argument mapping with high science-related attitudes were significantly different than taught by direct instruction with high science-related attitudes.

Kisoglu and Mustafa (2018) examined the attitude towards science high school students towards learning biology and their attitude towards biology lessons. The sample of the study consists of 564 high school students (308 females, 256 males) studying at two science high schools in Aksaray, Turkey. In the study, the relational scanning method, which is a descriptive scanning model, was utilized, with data obtained using the "Academic Motivation Scale for Learning Biology", consisting of four subdimensions (intrinsic motivation, amotivation, extrinsic motivation-career and extrinsic motivation-social) and 19 items, and the "Biology Science and Course Attitude Scale", consisting of three subdimensions (interest, pleasure and anxiety) and 23 items. Data were interpreted in accordance with arithmetic mean, percentage, frequency and significance levels. The significance level was taken as 0.05. As a result of the research, the arithmetic means of students' intrinsic motivation and extrinsic motivation-career subdimensions were found to be above the scale mean. Students' mean score in the amotivation and extrinsic motivation-social subdimensions were below the scale mean. However, in each of the subdimensions on the attitude scale, students' arithmetic means were average. The highest relation among the subdimensions of the motivation and attitude scales was found to be between the intrinsic motivation and interest subdimensions and the intrinsic motivation and pleasure subdimensions. Nevertheless, as a result of the evaluation conducted in terms of students' gender and class level, it was determined that there was a significant difference between their gender and class levels in the subdimensions of motivation and attitude scales.

Kousa, Kavonius and Aksela (2018) determined low-achieving Students attitudes towards chemistry and how the attitudes differ within a low achieving group. The most preferred teaching methods were also defined. Empirical data ($n = 2949$) were collected by stratified sampling from fifteen-year-old Finnish lower-secondary school students as part of a Finnish National Board of Education assessment. The students were divided into five groups according to their achievement in the chemistry-exam. 159 of the students who had deficient exam results were defined as low-achieving (LA) students, and within that group non-native speakers, students with special needs and gender were selected as the background variables. Boys, non-native speakers and those who had special support had more positive attitudes towards chemistry within the LA group. The most preferred teaching methods in the low-achieving group were (i) visiting companies, institutes, museums and exhibitions; (ii) using the internet, videos, magazines and books for studying and (iii) small group working. According to the LA students their teachers should take more into account their wishes for teaching methods. This study suggests that more positive attitudes could lead to a better achievement when the teaching methods are preferred by most of the students. This paper proposes some ideas for both teachers and teacher training.

Manual and Guido (2018) studied that the attitude of students towards Physics was considered as one of the most prevailing and problematic subjects by the students in the

realm of science. Students perceived physics as a difficult subject during high school days and become more evasive when they reach college. Based on an investigation of 446 engineering and technology students, this study analyses and evaluates the relationship between attitude and motivation of engineering and technology students towards learning physics. It shows that there is no significant difference in the attitude and motivation of students towards learning physics. Furthermore, there is a negligible degree of relationship for attitude and motivation. The relationship between attitude and motivation is due to chance. This confides that most students found that is unlikely for them to enjoy learning physics because of their professor. Faculty should encourage students in drilling physics problems, students are found to like answering difficult physics questions in ever examination, expresses that they have a mathematical mind.

Mujtaba and Sheldrake (2018) investigated that there was a widespread concern that relatively few students, especially those from disadvantaged backgrounds, continue to study chemistry and other science subjects after compulsory education. Yet it remains unclear how different aspects of students' background and home context, their own attitudes and beliefs, and their experiences of particular teaching approaches in school might limit or facilitate their studying aspirations; concurrently, less research has specifically focused on and surveyed disadvantaged students. In order to gain more insight, 4780 students were surveyed, covering those in Year 7 (age 11–12 years) and in Year 8 (age 12–13) from schools in England with high proportions of those from disadvantaged backgrounds. Predictive modelling highlighted that the students' aspirations to study non-compulsory science in the future, and to study the particular subject of chemistry, were strongly associated with their extrinsic motivation towards science (their perceived utility of science, considered as a means to gain particular careers or skills), their intrinsic interest in science, and their engagement in extra-curricular activities. Additionally, their self-concept beliefs (their confidence in their own abilities in science), some teaching approaches, and encouragement from teachers and family alongside family science capital had smaller but still relevant associations.

Pasternak, Deborah and Volet (2018) studied the student interest in science, lack confidence and have negative attitudes towards teaching science, with this trend starting during initial education. Though research on attitudes of students towards science is well established, less is known about attitudes towards learning science. In order to advance our understanding in this area, this study mapped the entry and evolution of attitudinal profiles towards learning science of 108 secondary schools undertaking a first-year science unit. Participants completed an online survey tapping on self-determination, grade motivation, self-efficacy, difficulty, interest, anxiety and enjoyment in science before the commencement of the unit (T1) and at the end of it (T2). Clustering methods were used to group participants into homogenous attitudinal profiles at both points in time. Subsequently, cluster profile analysis was used to examine qualitative changes in final profiles respective to entry. Four distinct attitudinal profiles were identified with 47% of the participants exhibiting the least favourable profiles at the start of the science unit. Migration (T1 to T2) was more prevalent from the least to the most favourable profiles however, it did occur in the opposite direction. Findings revealed that, though students of secondary level increased their confidence in their ability to learn science, their self-determination decreased in all but one of the eight resulting cluster profiles.

Rutagen, Heine and Sutton (2018) studied attitude towards science seem to become ever

more polarized by whereas some put their faith in science, others routinely reject and dismiss scientific evidence. This chapter provides an integration of recent research on how people evaluate science. We organize our chapter along three research topics that are most relevant to this goal: ideology, motivation, and morality. We review the relations of political and religious ideologies to science attitudes, discuss the psychological functions and motivational underpinnings of belief in science, and describe work looking at the role of morality when evaluating science and scientists. In the final part of the chapter, we apply what we know about science evaluations to the current crisis of faith in science and the open science movement. Here, we also take into account the increased accessibility and popularization of science and the relations between science and industry.

Sariah and Hassan (2018) studied the aim of education is to ensure a holistic development towards knowledge and well-being. Despite exhaustive effort on embedding twenty-first century skills in science teaching, students show lack of interest to learn and pursue their science careers. This present study has attempted to develop an instrument for measuring attitude towards science learning. The purpose was to ensure valid items were identified to measure all aspects of attitude namely affect, behaviour and cognitive. The study of attitude in science will determine the direction on how teaching strategies can be successful in promoting interest in learning. The study has been underpinned from the theories related to Theory of Reasoned Action, Constructivist learning and Connectivism. Samples from three secondary schools were selected based on proportionate stratified random sampling. 350 samples were targeted to respond to self-constructed questionnaires. Confirmatory Factor Analysis (CFA) was employed to prove the hypothesised 5-factor measurement model. The results have supported a model fit with positive interactions between the factors are evident. The study has proven the theoretical contributions which embark on holistic development of an individual to ensure attitude is moulded. The emotional and spiritual aspects of learning are needed to ensure positive contribution to the social dynamic. In this paper, the discussions are elaborated from the standpoints of theories and practical importance. The results have contributed to a theoretical model of science teaching method.

Summers and Khalick (2018) studied the attitudes of students towards science and related constructs, by developing and validating an instrument suitable for cross sectional designs. Following a thorough review of the literature it was determined that many extant instruments included design aspects that appeared to be limited in some way. The BRAINS (Behaviours, Related Attitudes, and Intentions toward Science) Survey was designed to address core criticisms that have been levelled against many existing instruments. BRAINS were rooted in a theoretical framework drawn from the theories of reasoned action and planned behaviour (TRAPB). Initial development involved review by an expert panel, adaptation for online delivery and a pilot on this platform. To establish the psychometric validity of the 59 item instrument it was administered to a representative, random sample of 1,291 Illinois students in grades 5 through 10. Confirmatory factor analysis and subsequent refinement yielded a 30 item instrument with five factors and a good statistical fit including a RMSEA of 0.04 and a CFI of 0.95. The five factors, or constructs, of the final instrument model reflect the underlying TRAPB framework: attitudes toward science, behavioural beliefs about science, intentions to engage in science, normative beliefs, and control beliefs.

Yee and Manap (2018) investigated the attitude towards science among lower secondary students in Johor Bahru. The attitude in this study included interest, perception towards

science and motivation. The study was carried out in Johor Bahru, Johor. The study adopted quantitative descriptive research designs and questionnaires were used in the study. A total of 370 respondents constituted the sample of the study, which included Form 2 lower secondary students from Johor Bahru. Data was analysed to obtain frequency, mean and standard deviation. The results revealed that laboratory activity, curiosity to discovery science and science as a tool to understand the world is able to improve science learning. As a conclusion, interest especially created by laboratory activity, perception of student when they are curious to discovery science and motivation factor when students know that science as a tool to understand the world are able to improve students science learning in lower secondary schools in Johor Bahru. The implication was that school teachers could prepare more laboratory activities in science lesson. They also can stimulate students' curiosity to discovery science and related science knowledge to the world so that students are interested and motivated to learn science. Future studies on this subject would be beneficial to understand more deeply the relationship between student personal factors with science achievement.

Ananda, Suhandi and Rahman (2019) conducted a research to improved the students attitude towards science in one of the High school at Bandung City after follow science learning used ILD model assisted science magic. Research method is used pre experiment and one group post-test only design. The total sample of this research is 70 students, who were selected randomly in cluster. The instrument of the attitude towards sciences scale in this study is attitude towards sciences scale, which is consist of 30 items and refers to four dimensions. They are interest in science, importance of science in life, interest in advanced study in science, and interest in future career in science. The data was collected used Method of Successive Interval (MSI). The Result of this research showed that implemented ILD model assisted science magic can improve students' attitude toward science in High school.

Astaleni, Kurniawan and Sari (2019) studied the description of students attitudes towards science (physics) in Secondary School Jambi City of Indonesia. This research was quantitative-qualitative research with survey research procedures. The subjects of this study were 170 students. The instruments used were questionnaires and interview sheets. Quantitative data analysis using descriptive statistics while qualitative data analysis using data analysis techniques model Miles and Huberman. The results of the 3 aspects of attitude indicators discussed in this study were on the indicator of normality of scientists as much as 60% were categorized quite well. While the attitude towards investigation in physics was 51% in the good category, then in the indicator of interest in a career in the field of physics as much as 58% of students were categorized well.

Brew (2019) investigated the determinants responsible for the low performance of female students in science in the Aowin district. To achieve the purpose, the study was guided by five (5) objectives. Methodologically, descriptive research design was adopted for the study. The study employed quantitative approaches through the use of self – developed questionnaires. The female students in the five (5) educational circuits in the Aowin District participated in the study via responding to the developed questionnaires. In all, 375 female students were selected for the study using stratified and purposive sampling techniques. The obtained quantitative data analysis was analyzed using descriptive (means and standard

deviations). The study revealed that factors responsible for low performance of female students in general are identified as: poor psychological state of the female students in the Aowin district, the teachers in the Aowin district attitude towards the learning of science and finally, the socio – economic background of the parents in the Aowin District. It was therefore recommended that Ghana Education Service in the Aowin District should be encouraged to source for sufficient science teaching – learning resource materials so that each student has a science subject taught. The idea would lead to better performance in science subjects at High Schools in the Aowin District.

Humaid, Anwar and Oussama (2019) studied the attitude of students towards science and how science curriculum influences their intention to learn science subjects. A quantitative correlational research design was used. Data were collected through the survey method by using a questionnaire distributed randomly to 341 secondary school students of seven post-basic schools from Al-Sharkiyaha North governorate in Oman. The data were analysed using SPSS version 23.0. Pearson correlation findings revealed that students' attitude and science curriculum had a significant positive relationship in enhancing students' intention to learn science in post-basic education. This study offers insights for policymakers, school administrators and teachers on understanding the role of students' attitude towards learning science subjects, and the nature and design of the science curriculum on students' intention to continue learning science subjects in post-secondary education. The findings indicated that by employing effective instructional strategies and engaging curriculum, school teachers could facilitate students to develop positive intentions to continue learning science subjects in post-secondary education.

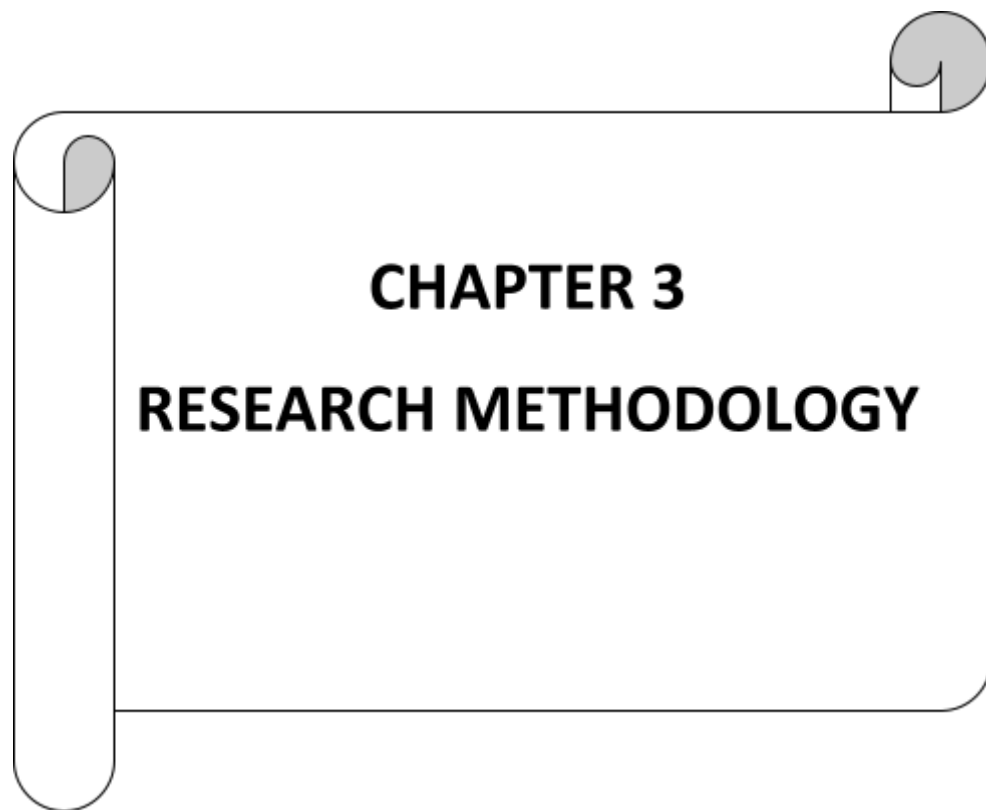
Iberahim and Zakiang (2019) conducted a study on attitude of students towards Physics. Physics was considered as the most challenging area of learning within the field of science and it usually magnetises fewer students compared to other science related subjects from secondary school to university. Generally, students tend to have a negative attitude towards physics presumably because they lack interest in the subject and the syllabus itself. This research is carried out to study the learning attitude in physics and challenges towards learning force and motion among Form Four students in Klang. A total of 200 secondary schools students who are taking physics subject from six schools participated in the study. A descriptive research design was employed using survey method to analyse the students' attitude towards learning physics. The findings on the learning attitudes test showed majority of the students have favourable attitudes in learning physics. However, majority of students hold poor score in physics test, probably due to low science grade obtained by students in 'Penilaian Pentaksiran Tingkatan 3' (PT3). Another finding from the data revealed that the nature of topic was found to be the most predominance challenge in learning force and motion among the participants. The findings are beneficial as they can serve as a stepping stone in overcoming the underlying sources of difficulty that impede quality learning of physics. More in depth study is needed to look into this matter with more number of participants including teachers who are teaching physics.

Khitab, Zaman, Ghaffar and Jan (2019) investigated the impact of low cost teaching material on students attitude towards science (Chemistry) at secondary level in Khyber Pakhtunkhwa Pakistan. This was an experimental study. Each group i.e. Experimental and control was consisted of 30 students of Grade 12 science stream. To assess the impact of low

cost teaching material on students' attitude towards science (Chemistry) a modified form of Test of Science-Related Attitudes (TOSRA) comprised of 29 items was used. The test was purely constructed on a Likert scale to measure the students' attitude towards Chemistry on the factors such as Behaviour tendency to learn Chemistry, Liking for chemistry laboratory work, Liking for Chemistry theory lesson, Evaluation belief about Chemistry, Leisure interest in science and the Enjoyment of Chemistry. Quantitative data were analyzed using t-test through Statistical Package for Social Sciences (SPSS). The main findings of the study indicated that students in the experimental group taught through activity with low cost materials showed significantly greater attitude towards science (Chemistry) than the control group.

Kurniawan, Astalini, Darmji and Melsayanti (2019) described the development of a new measure of attitude towards science for use among secondary school pupils which operationalises the affective attitudinal domain. Item selection, the internal structure and reliability of the scale, content validity and construct validity were established on a sample of 2129 pupils in the third, fourth, fifth and lower sixth years of Protestant and Catholic grammar schools in Northern Ireland. Scale norms demonstrate that males record a more positive attitude towards science than females, and that younger pupils record a more positive attitude towards science than older pupils.

Toma, Greca, and Gomez (2019) studied the attitudes towards science and nature of Science among secondary school students. The purpose of this study was examined the attitudes towards science and views of Nature of Science among Spanish students, Spanish students of gypsy ethnicity and second-generation Spanish students with east-European heritage, and to determine if their attitudes were related to their views of Nature of Science. This study stressed the need to address the steady decline in positive attitude toward Science and to improve Students views towards science and to use gender and culturally inclusive science teaching strategies.



CHAPTER 3

RESEARCH METHODOLOGY

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research methods play a important role in a Research Process. Research Methodology is actually a way in systematically solve the research problems. It can also be understood as a sciences of studying how research is done Scientifically. Its aim is to give work plan of research. The purpose of study may vary from researcher to Researcher in terms of where it is to be conducted and the applications that are to be made of it. In addition, great differences in the capacities and characterstics among the indiuivals who do research work are a proved fact. These all methods resist interpretation in term of formula of standardization.

The decision about the method and methods to be employed always depend upon the nature of the problem selected and the kind of data recovery for its solution whatever methods is to be employed, it is essential that it should be describable otherwise it will lose its significance and effectiveness. Thus if the research methodology cannot be clearly described, chances are that the results the results of the study will be too indistinct and broad-spectrum (Mouly,1970)

The present chapter throws light on the research methodology being adopted for the present study. Here Research objectives and design of the study i.e sample for the study and selection of the research instrument are discussed. Methods for the collection of the data and statistics for analyzing the data are also discussed.

3.2 DESIGN OF THE STUDY

3.2.1 Sample for the study

Sampling is the process by which a relatively small number of indiuivals or measure of indiuivals, object or event is selected and analyzed in order to find out something about which the entire population from it was selected. In any scientific investigation, sampling plays an important role. It gives us accuracy, reduce cost, bring speed and increase scope

3.3 Tool Employed

In present study, a random sampling technique was employed for collecting the data of 200 students from 8 different schools of Jammu District. The sample will cover science classes at the secondary level in selected Rural and Urban schools of the Jammu. The sample will be chosen carefully so as to be representative of the population and comprises of coeducational classes in order to permit an unbiased test of gender differences. The sample will involve about 200 students from eight secondary schools of Jammu i.e Four rural and Four Urban schools of Jammu (25 students from each school). Out of the sample 200 students 100 were male students and 100 were female students so that an unbiased study of gender differences

could carried out. The sample involved students from 9th & 10th classes spread in the age group of 13 to 15 years. Random sampling was done for collecting the data from different schools of Jammu, Such schools provides the right atmosphere to study and assess their attitudes towards Science. Details of the sample are presented below in table 3.1

Table 3.1

List of Schools and Students in the Sample

S.NO	NAME OF THE SCHOOLS	NUMBER OF STUDENTS		AREAS
		BOYS	GIRLS	
1	Govt. High School,Domana	13	12	Rural
2	Govt.Higher Sec.School,Domana	12	13	Rural
3	S.D Memorial Public Higher Sec. School,Chand Nagar	13	12	Rural
4	Govt. Mixed High School,Purkhoo	12	13	Rural
5	M.C Khalsa High School,Chand Nagar	13	12	Urban
6	Govt. High School,Rehari	13	12	Urban
7	Govt. High School, Sarwal	12	13	Urban
8	Govt.Higher Secondary School,Bakshi Nagar	12	13	Urban
	TOTAL	100	100	

3.3.1 RESEARCH INSTRUEMENT SELECTION

The tool used for present study was Attitude towards Science scale developed by Dr. Savita Mishra.

The Attitude towards Science Scale is for responses has five alternatives, based on likert scale The five alternative are: Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The Attitude towards Science Scale has both positive type and Negative type.

Table 3.2

Scoring System

Type of Item	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Positive	5	4	3	2	1
Negative	1	2	3	4	5

3.3.2 Reliability of the tool

The Reliability of the attitude Towards Science Scale now consisting of 75 items was measured through test-retest method over the representative sample of 400 who had not taken the test earlier, but represented the same population from which the sample was drawn. The same scale was again administered over the same sample after a month and the co-efficient of correlation between the two sets of scores obtained through Pearson Product Moment Method was found to be 0.78. Sood (1975), Grewal (2012) found test-retest reliability coefficients for their attitudes scales (Attitude towards Science) as 0.76 and 0.77 respectively. However Bhagwat (2006) had test-retest reliability co-efficient of the Scientific Attitude Scale as 0.94, Gakhar and Kaur (2014) found a reliability co-efficient of 0.70. In the view of the above observations, the reliability co-efficient of the present Attitude towards Science Scale was considered satisfactory. The dependability of the Attitude towards Science Scale was studied as an estimate of the reliability co-efficient in terms of standard error of measurement as suggested by Guilford (1965), Ferguson (1986) and Garrett (1961). The Standard error of measurement of the scale was estimated to be 11.01 which was small and when it is small, it is presumed that a degree of confidence in the true score is not far away is built (Guilford and Frutcher, 1978). Based upon the above observations, the Attitude towards Science Scale developed by the investigator with a reliability co-efficient of 0.78 and a standard error of measurement of 11.01 was considered as a reliable instrument for measuring the secondary schools students attitude towards science.

3.3.3 Validity of the tool

The Validity evidence in its content and internal validity have been established through the inclusion of items of the scale, quite representative of wide areas on attitude towards science,

experts view on Judgement of items to be included in the scale component wise. The internal validity evidence has been supported through 't' values (Edwards,1957). Every statement

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included in the final scale has 't' value of 1.98 and above

The criterion related evidence to validity has been established by calculating the concurrent evidence to validity through correlating the scores with the scores obtained by the respondents on Grewal's (2012) Science Attitude Scale and the Validity index obtained was 0.464 which was highly significant.

Kar (1990) found a concurrent validity index of 0.60. Gakhar and Kaur (2014) found out content validity on his Scientific Attitude Scale. Basing upon these observations, the validity co-efficient on this scale, evidences to content and internal validity the scale was considered valid and the measuring instrument was considered as a good tool to assess the students attitude towards science.

3.3 DATA COLLECTION PROCEDURE

The data collected for the study was quantitative in nature, which was obtained by administering the Attitude towards Science scale. The students responded to items using a five point frequency response format (viz. strongly agree, agree, undecided, disagree, strongly disagree). The questionnaire was administered to a sample of 200 students selected randomly from eight schools of Jammu District i.e four from rural areas of Jammu and four from urban areas of Jammu District.

3.4 DATA ANALYSIS

Data collected after administering the Attitude Towards Science scale developed by Dr *Savita Mishra* was first tabulated and coded in an Excel file. The data was then statistically analysed using SPSS software. The statistical tools were selected from the point of view of achieving the research objectives proposed for the study.

The first research objective aimed to assess the students overall attitudes towards science, which was achieved by finding out the means and standard deviations on the five scale Questionnaire.

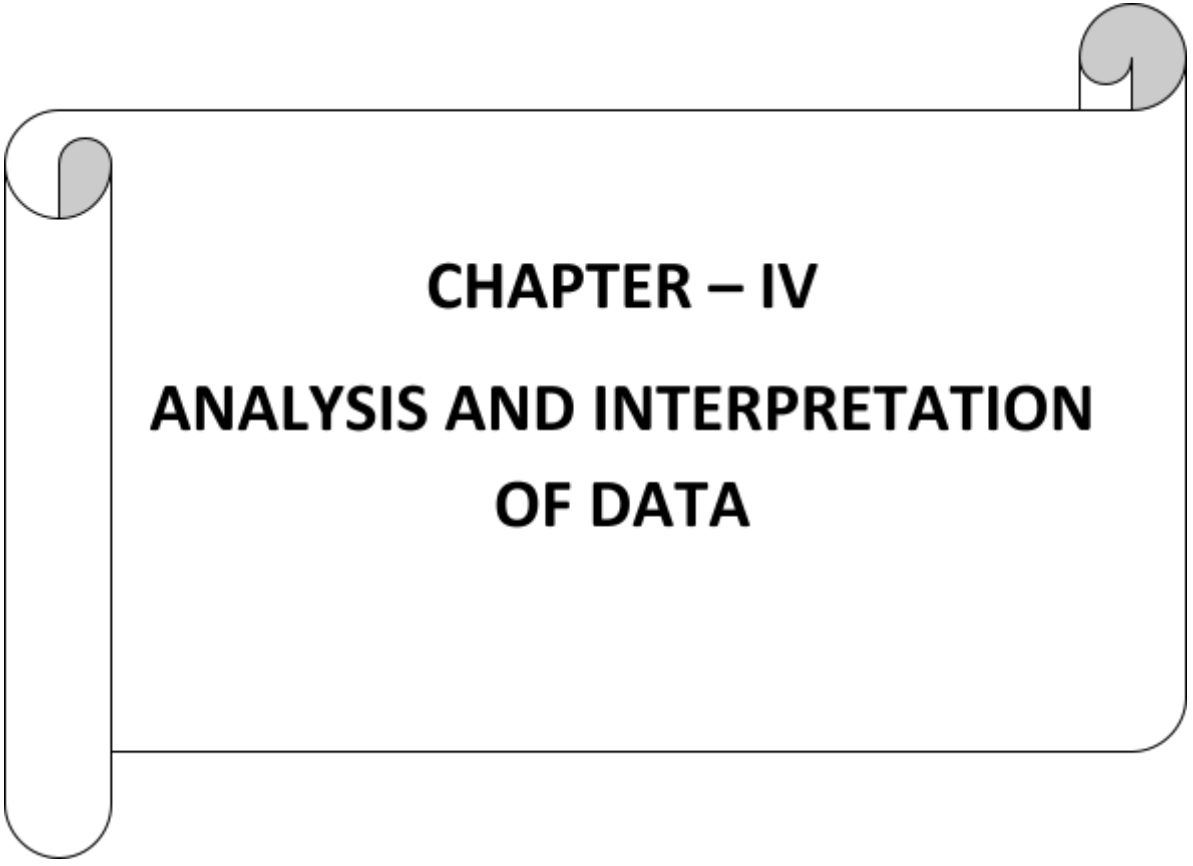
The second and third Research objectives study the attitude of high school students towards science in relation to their areas, gender was achieved by using *t*-test.

3.5 CHAPTER SUMMARY

This chapter gives detailed information on the research methodology used in the study which was quantitative nature. A questionnaire survey method was used to collect information. Finally, the process of data analysis was described which included the statistical tools for

determining the reliability and validity of tool. Finally the analysis of gender differences on the five scales of Attitude Towards Science scale was done using the ' t '-test.

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CHAPTER – IV

ANALYSIS AND INTERPRETATION OF DATA

CHAPTER-IV

ANALYSIS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

Analysis of data means categorizing, ordering, manipulating and summarizing the data to obtain answers to the research questions. The purpose of analysis is to reduce data into intelligent and interpretable form so that meaningful result can be arrived at analysis of the data can be done in the light of the objectives of the study.

The most important step in any research project is the analysis and interpretation of the data collected. After the data has been collected and tabulated, it must be processed and analyzed properly, so as to draw proper inferences. A systematic and scientific treatment of the tabulated data for drawing valid conclusion which involves breaking of complex factors into simpler parts and putting them in new arrangement for the purpose of interpretation is known as analysis of data.

The present chapter describes the results from the quantitative analysis of data obtained through the administration of the scale developed Dr. Savita Mishra to study the attitudes of secondary school students towards science. The quantitative analysis done in this chapter will seek to achieve all the research objectives. This chapter deals with the study of overall attitude of secondary school students towards science. Gender differences that occur in students perception of attitude towards science are also discussed in this chapter. Lastly the chapter involves the study of the attitude of secondary school students towards science in relation to their type of school in which they are studying (rural and urban).

4.2 RESULTS AND FINDINGS

The data on seven scales of the tool developed by Dr. Savita Mishra are collected from 200 students who have been studying in secondary schools. Item means and standard deviation are computed to determine the attitude towards science studying in rural and urban schools using scale. The resulting data obtained were analyzed using statistical techniques namely mean, standard deviation and t-test.

4.2.1 Research Objective 1

To assess the students attitude towards science at the secondary level

TABLE 4.1

Overall attitude of students towards science

Sr.No.	Range of raw score	Range of Z-score	Level of Attitude Towards Science	No. of students	Percentage of students
1	311 and above	+2.01 & above	Extremely Favourable	41	20.5
2	295 to 310	+1.26 to +2.00	Highly Favourable	41	20.5
3	279 to 294	+0.51 to +1.25	Above Average Favourable	80	40
4	258 to 278	-0.50 to +0.50	Moderately Favourable	11	5.5
5	243 to 257	-1.25 to -0.51	Unfavourable	19	9.5
6	227 to 242	-2.00 to -1.26	Highly Unfavourable	8	4
7	226 and less	-2.01 & below	Extremely Unfavourable	0	0

It is interpreted from the table 4.1 that 41 no. of secondary school students having 20.5% of extremely favourable attitude towards science, it is interpreted that 41 secondary school students have 20.5% highly favourable attitude towards science, it is interpreted that 80 secondary school students have 40% above average favourable attitude towards science, it is interpreted that 11 no. of secondary school students have 5.5% moderately favourable attitude towards science, it is interpreted that 19 secondary school students have 9.5% unfavourable attitude towards science, it is interpreted that 8 no. of secondary school students have 4% highly unfavourable attitude towards science, it is interpreted that 0 no. of secondary school

students have 0% of extremely unfavourable attitude towards science. Hence we can say that there is a positive attitude of students towards science.

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4.2.2 Research Objective-2

To investigate whether gender differences occur in students attitude towards science

To investigate whether gender differences occur in students attitude towards science the means and standard deviation. For each of the male and female groups were compared followed by the t-test on the seven scales of the tool. Table 4.2 gives the results of the statistical analysis.

TABLE- 4.2

Summary of t-statistics in relation to the Gender

Sr.No.	Gender	N	Mean	Std. Deviation	Std. Error Mean	df	t	Level of significance
1.	Male	100	260.71	20.14	2.01	198	3.09	Significant at 0.01 level
2.	Female	100	269.77	21.33	2.13			

Significant at 0.01 level

The calculated 't' value against df 198 is 3.09, the table value to be significant at 0.01 and 0.05 level It is clear from the table 4.2 that there is significant difference between the means of attitude of males and female students towards science. Female students have higher mean value as compared to male students, it shows that female students have high attitude towards science. Thus, there is significant difference in the attitude of secondary school students towards science in relation to their gender. Therefore, Hypothesis is rejected.

4.2.3 Research Objective -3

To compare the students attitude towards science at the secondary level in rural and urban schools of Jammu

The final objective of the present study is to study the attitudes of secondary school students towards science in rural and urban schools of Jammu. To achieve this objective t-ratios are computed. For this purpose data were collected from eight schools (four rural and four urban) where science has been taught as one of the compulsory subjects. The data thus obtained are subjected to statistical analysis using the test of significance of means (t-test) to determine if

significant differences occurred in the science related attitudes at secondary level of rural and urban schools. Results of the data analysis is presented in table 4.3.

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TABLE- 4.3

Sr.No.	Area of school	N	Mean	Std. Deviation	Std. Error Mean	df	t	Level of significance
1.	Rural	100	266.58	22.39	2.24	198	0.89	NS
2.	Urban	100	263.90	19.93	1.99			

InSignificant at 0.05 level

It is clear from table 4.3 that the calculated 't' value against df 198 is 0.894, the table value to be not significant at 0.01 and 0.05 level of significance. The calculated value of 't' is less than table value. It indicates that there is no significant difference between the means of attitude of students towards science belonging to rural and urban areas of Jammu. Thus, there is no significant difference in rural and urban school students.

CHAPTER-V

**FINDINGS, CONCLUSIONS,
EDUCATIONAL IMPLICATIONS
AND SUGGESTIONS FOR
FURTHER RESEARCH**

CHAPTER 5

FINDINGS, IMPLICATIONS & SUGGESTIONS

5.1 INTRODUCTION

Science has brought about a lot of changes in the life of man. It is due to science that is leading a comfortable and secured life. Most of the things we use in our life are the result of invention of science. Without scientific knowledge and technological advancements, civilizations cannot evolve. Today's children have the opportunity to learn about science in a different way than generation before them as the world is undergoing dramatic changes that affects how they will live and survive in future. A large portion of the problems that students deal within science classroom are often 'well structured problems' that simply demand using unknown formula or regurgitating rote-learned facts to provide a definite answer.

Consequently, these problems provide students a limited opportunity to apply scientific knowledge that they have learned in science classes to explain natural phenomenon or make decision about real life scientific issues. The national science education standards (National Research Council, 1996) emphasize that students need to have an understanding of the natural world, appropriate processes and principles for individual decision making and debate regarding scientific concerns.

Extensive research has shown that student's attitudes are learned, as opposed to being inherited. Many factors can influence a person's attitude, including previous experiences and social influences. Attitude toward science can be defined as "favourable or unfavourable feelings about science as a school subject," (Morrell & Lederman, 1998), which is the definition used for this study. The type of science courses taken, previous science experiences, science teachers, and various factors others can influence these attitudes toward science (Morrell & Lederman, 1998). The impact of a student's attitude towards science is incredibly important. Recent research has shown that nearly fifty percent of students may lose interest in science by the third grade (Weinbergh, 1998). Participation in science is also being affected, as the number of students preparing for a science related career is on the decline (Chapman, 1997). Previous experiences in science can heavily correlate a student's attitude toward science. Research has demonstrated that, "attitudes toward science change with exposure to science, but that the direction of change may be related to the quality of that exposure." (Gogolin & Swartz, 1992). Therefore, appropriate science classroom learning environment should be provided to students for the development of scientific attitude among them. The present study compares of attitudes of students towards science at secondary level

in rural and urban areas of Jammu. A sample of 200 students was taken from eight schools (four rural and four urban). A quantitative research methodology was adopted. The tool used in the study was developed by Dr. Savita Mishra. The major findings of the study are discussed below.

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5.2 MAJOR FINDINGS OF THE STUDY

The major findings of the present study are reported in the following subsections.

5.2.1 Research objective 1

To assess the student's attitude towards science at the secondary level.

The data on five scale of the tool are collected from 200 students who have been studying science. Items means and percentage are computed to determine the attitude towards science at secondary level of both the rural and urban schools using the tool. The results show that students in both the rural and urban schools have generally a positive attitude towards science. They think that the process inquiry can be developed through the study of science and are also ready to adopt a scientific attitude. The results also show that students tend to enjoy lessons in science and are interested in science related activities. Students have generally expressed a desire to pursue a career in science. The value of standard deviation on the scale of attitude towards science is less than 1, which suggests that there are no major deviation in student's attitude towards science.

5.2.2 Research Objective 2

To compare the student's attitude towards science at the secondary level in rural and urban schools of Jammu.

To study the attitude of secondary school students in relation to their type of school. To achieve this objective data was collected from eight schools (four rural and four urban) where science is taught as one of the compulsory school subjects. The data thus obtained are subjected to statistical analysis to determine if significant differences occurred in science related attitudes in rural and urban schools. The results illustrates that at one out of five scales of the tool differ significantly in terms of their science related attitudes i.e attitude of scientific inquiry. The value of the mean score of urban school is higher. This suggests that students of urban school posses a positive attitude towards science as compared to rural students. They enjoy science and are ready to pursue their career in science as compared to the rural areas students. The results also show that the students of the urban schools are more curious to learn new things in science.

5.2.3 Research Objective 3

To investigate whether gender differences occur in student's attitude towards science.

To investigate whether gender differences occur in student's attitude towards science the mean and standard deviations for each male and female groups were computed followed by the t-test. Results of the objective states that there is no significant difference between the

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attitude of males and females towards science. Thus there is no difference in the attitude of secondary school students towards science in relation to their gender.

5.3 IMPLICATIONS OF THE STUDY

Based on the result of the present study the following implications can be offered.

- School and teachers should launch such programmes such as exhibition, educational tours etc which help in developing scientific attitude among students.
- Results of the study can be used to assess the attitude of students in rural and urban school and also in relation to their gender, thus steps should be taken accordingly, to improve and develop scientific attitude in the students.
- The study is significant because the outcome can provide guidelines for Policymakers and teachers to improve science education in Jammu.

5.4 SUGGESTIONS FOR FUTURE RESEARCH

Some of the probable areas of research, which invite attention, are as follows

- A sample of 200 students was taken in the present study. However, the same study can be conducted using a large sample.
- The present study was limited to few variables such as overall attitude of students towards science in relation to their gender and type of school. The same study can be undertaken considering other variables such as age of the students, their residential background, occupation of their parents and their socio-economic status.
- Since the present study was limited to secondary school level the same study can be implied for higher classes at college and university level.
- Furthermore, the information provided from the study would have the potential to assist teachers in identifying factors that would contribute towards creating a positive attitude towards science among the students of secondary level.
- In order to develop the scientific attitude and to sustain it, it is necessary to define the objective to be fulfilled through science education by practitioners and policy makers of education. These objectives could also be evaluated by future research studies.



SUMMARY

INTRODUCTION

Education has always been regarded in India as a source of illumination and power. It always transforms and ennobles our nature by Progressive and Harmonious development of our physical, mental, intellectual and spiritual powers. According to Swami Vivekananda-“we need that education by which character is formed, strength of mind is increased, the intellect is expanded and by which one stands on ones feet and result in manifestation of perfection already in men.”

Education is the oldest and largest human enterprise in terms of men power involved in its pursue. But despite consistent efforts, since time immemorial, to make its more effective, need based, responsive and for realization of its goals/objectives. If continues to be on the process of transformation. We know education is a potent tool of social transformation, behavioural modification and a key to indiuivals intellectual, economic and social development.

Today all the educational institutions are on the way to improve their quality, naturally more emphasis is given to quality education. The target of every educational program is to ensure that the pupils/students achieve a satisfactory outcome (good performance).

As regards the attitude of students towards science, it denotes the interest or feeling of students towards studying science. Attitude of a student towards science denotes the disposition towards its ‘liking’ or ‘interest’ and ‘disliking’. Interest of a student in science means scientific approach assumed by that student for solving problems, assessing ideas and making decisions pertaining to that particular subject. Many researchers are of the opinion that attitude towards science is a significant predictor for some levels of science students.

The 21st century is fast-paced and highly competitive. Each day, we make important decisions that will greatly impact our lives today and well into the future. Moreover, we are provided greater amounts of increasingly complex information than ever before. However, our society’s collective sense of literacy is outdated. Many people still think of science literacy as simple being informed about new advances, for example, in medicine and technology. This definition of scientific literacy will no longer suffice in this new information age. In the 21st century, science literacy is the occupational capacity to apply information in an appropriate contest, to analyse information, to synthesize information from various sources or o)n various topics and evaluate information to determine the best course of action (the urban scientist, 2008).

Science education aims at increasing common knowledge about science and widening social awareness of scientific findings and issues. Learning science requires its language, which often differs from daily language. Learning science goes beyond scientific facts, principles

and theories. One of its aims is to attain conceptual understanding of science. Today's science intends to produce citizens who can deal with words, concepts and scientific symbols necessary for the technologically advanced modern age (Gafoor and Akhilesh, 2008)

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For many the term science refers to the organized body of knowledge concerning the physical world, both animate and inanimate, but proper definition would also have to include the attitudes and methods through which this body of knowledge is formed; thus, a science is both a particular kind of activity and also the results of that activity.

Science as defined by Hutchinson encyclopaedia,

“Any systematic field of study or body of knowledge that aims, through experiment, observation and deduction, to produce reliable explanations of phenomenon, with reference to the material and physical world.”

Science is a subject which has revolutionized all walks of life. Some students take interest and some students feel boredom while studying science. The Attitude of students differ at different levels especially at secondary level. The attitude towards science or scientific attitude may be operationally taken as the generalized attitude towards science, content of which is being measured in terms of its favourableness or unfavourableness. Apart (1935) opined that the attitude towards science refers to the feelings, opinion, beliefs in and indirectly with various aspect of the scientific enterprise and which exerts a direct influence on their behaviours towards science (Ahamed, Raheem & Hassan, 2003)

Keeves (1992) asserted that attitude towards science are known to decrease as students progress through their schooling years. He further submitted that attributes such as enthusiasm, respect for students and personality traits have been shown to influence Students attitude towards science as well as in other subjects. The implication of Keeves findings is that attention should be given to science teaching early so as to enable students to have favourable disposition towards science later in life.

Science has brought about lot of changes in the life of man. It is due to science that man is leading a comfortable and secured life. Most of the things we use in our life are the result of the inventions of science. Without scientific knowledge and technological advancements, civilizations cannot evolve. Today's children have the opportunity to learn about science in a different way than generations before them as the world undergoing dramatic changes that affects how they will live and survive in the future. A large portion of the problems that students deal within science classroom are often 'well structured problems' that simply demand using known formula or regurgitating rote learned facts to provide a definite answer. Consequently, these problems provide students a limited opportunity to apply the scientific knowledge that they have learned in science classes to explain natural phenomenon or make decision about real life scientific issues. The National Science Education Standards (National Research Council, 1996) emphasize that students need to have an understanding of the natural world, appropriate processes and principles for individuals decision making and debate regarding scientific concerns.

Extensive research has shown that students attitudes are learned, as opposed to being inherited. Many factors can influence a persons attitude including previous experiences and social influences. Attitude toward science can be defined as, “favourable or unfavourable feelings about science as a school subject,” (Morrell & Lederman, 1998). The impact of a student’s attitude toward science is incredibly important. Recent research has shown that nearly fifty percent of students may lose interest in science by the third grade (Weinberg,

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1998). Participation in science is also being affected, as the number of students preparing for a science-related career is on the decline (Chapman, 1997).

SIGNIFICANCE OF THE STUDY

The present study is significant because it is for the first time that a study of attitudes of secondary school students has been undertaken. The study deals with the study of attitude of secondary school students towards science in rural and urban schools of Jammu. This study will give data to the researchers on which they can base future studies in the science in schools and other educational settings. The study is significant because the outcomes could provide guidelines for teachers, educationists and other policy makers to improve science education in Jammu, which could lead to the development of positive attitude towards science. Furthermore, the information provided from the study would have the potential to assist teachers in identifying factors that contribute towards creating a positive attitude towards science among the students of secondary school.

STATEMENT OF THE PROBLEM

To study the Attitude of Students Towards science at Secondary level in Rural and Urban Schools of Jammu

OPERATIONAL TERMS

Attitude

Attitude is the degree of positive or negative affect associated with some psychological object. In this study, psychological object is the attitude of a student towards science subject that has been measured by using Test of science related attitude developed by *Dr.Savita Mishra*.

OBJECTIVES OF THE STUDY

The objectives of the proposed research study are:

1. To assess the students attitude towards science at the secondary level.
2. To compare the students attitude towards science at the secondary level in rural and urban schools of Jammu
3. To investigate whether gender differences occur in students attitude towards science.

DELIMITATIONS OF THE STUDY

1. The study has been delimited to students of a few rural and urban schools of Jammu.
2. The study has been delimited to 200 students and that to at the secondary level only.

3. The study was only quantitative in nature.
4. The study has been delimited to one tool only Attitude towards science scale developed by Dr. Savita Mishra.

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SAMPLE OF THE STUDY

In present study, a random sampling technique was employed for collecting the data of 200 students from 8 different schools of Jammu District. The sample will cover science classes at the secondary level in selected Rural and Urban schools of the Jammu. The sample will be chosen carefully so as to be representative of the population and comprises of coeducational classes in order to permit an unbiased test of gender differences. The sample will involve about 200 students from eight secondary schools of Jammu i.e Four rural and Four Urban schools of Jammu (25 students from each school). Out of the sample 200 students 100 were male students and 100 were female students so that an unbiased study of gender differences could carried out. The sample involved students from 9th & 10th classes spread in the age group of 13 to 15 years. Random sampling was done for collecting the data from different schools of Jammu, Such Schools provides the right atmosphere to study and assess their attitudes towards Science.

TOOL USED

The tool used for present study was Attitude towards Science scale developed by Dr. Savita Mishra.

The Attitude towards Science Scale is for Responses has five alternatives, based on Likert scale the five alternatives are: Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The Attitude towards Science Scale has both positive type and Negative type.

RESULTS OF THE STUDY

The data on the five scale of the tool was collected from 200 students who have been studying science. Item mean and standard deviation are computed to determine the attitude towards science at secondary level of both rural and urban schools using the tool developed by Dr. Savita Mishra. The results show that students in both rural and urban schools have generally a positive attitude towards science. They think that the process of inquiry can be developed through the study of science and are also ready to adopt a scientific attitude. The results also show that students tend to enjoy lessons in science and are interested in science related activities. Students have generally expressed a desire to pursue a career in science. The value of standard deviation on the scales attitude towards science is less than 1, which suggests that there are no major deviations in students attitudes towards science.

Item mean and standard deviation are computed to determine the attitude of students towards science studying in rural and urban schools using scale. Results of the study reports that 41% of the secondary school students have above average favourable attitude towards science. It is interpreted that 80% of the secondary school students have moderately favourable attitude towards science. It is interpreted that 19% of the secondary school students have highly unfavourable attitude towards science. The results shows that the students possess a positive attitude towards science. They enjoy science and ready to pursue their career in science.

Attitude of secondary school students towards science was investigated in relation to their gender in rural and urban schools. The mean and standard deviation for each of the male and female groups were compared followed by t-test for independent samples on five scale of the tool attitude towards science. Result of the objective revealed that there is a significant difference between the means of attitude of males and female students towards science. Thus, there is significant difference in the attitude of secondary school students towards science in

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relation to their gender.

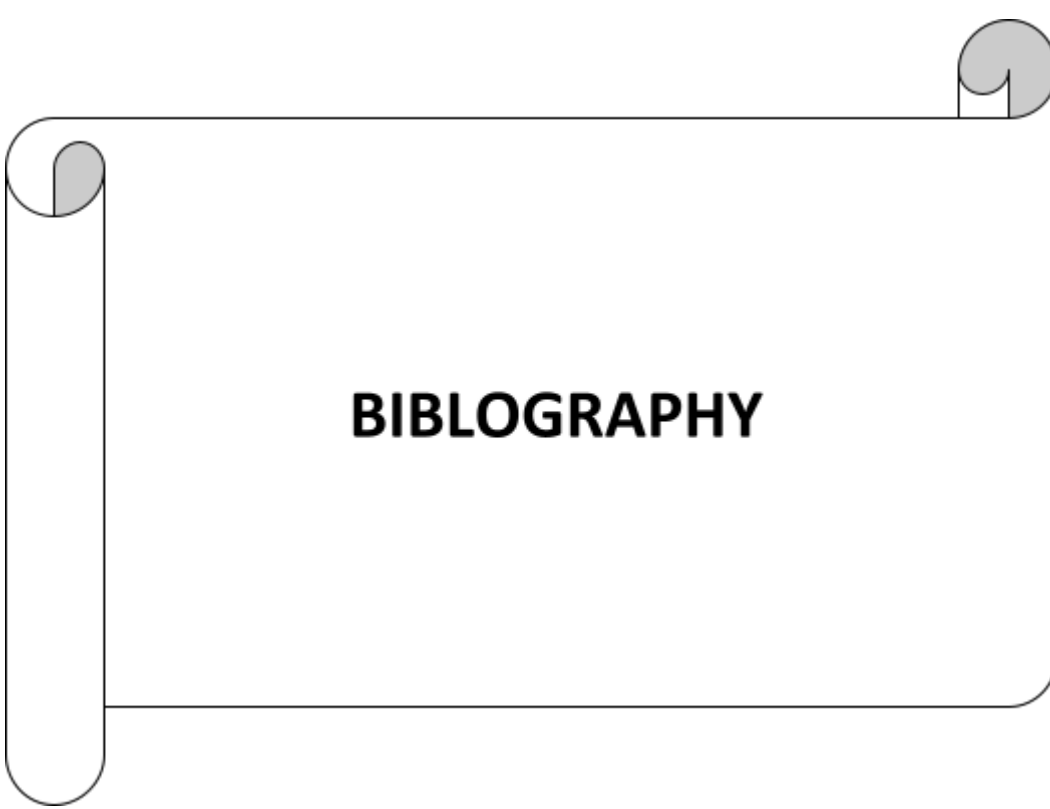
The final objective of the present study is to study the attitude of secondary school students towards science in relation to their type of school. To achieve this objective data was collected from eight schools (four rural and four urban) where science is taught one of the compulsory subjects. The data thus obtained are subjected to statistical analysis using the test of significance of means (t-test) to determine if significant differences occurred in the science related attitudes at secondary level of rural and urban schools. The results illustrate that there is no significant difference between the means of attitude of students towards science belonging to rural and urban areas of Jammu. Thus, there is no significant difference in the attitude of secondary school towards science in relation to area of school.

SUGGESTIONS FOR FUTURE RESEARCH

Some of the probable areas of research, which invite attention, are as follows

- A sample of 200 students was taken in the present study. However, the same study can be conducted using a large sample.
- Since the present study was limited to secondary school level, the same study can be implied for higher classes at college and university level.
- The present study was limited to few variables such as overall attitude of students towards science in relation to their gender and type of school. The same study can be undertaken considering other variables such as age of the students, their residential background, occupation of their parents and their socio-economic status.
- The present research study provides grounds for future research that would enable the various boards of school education to bring improvement in attitudes towards science especially by modifying curriculum development, teacher interpersonal behaviour, instructional strategy etc.
- Another important direction which emerges from this study is to have research studies conducted with the student's attitude towards science in different classrooms at the pre-school, primary, higher secondary and college levels, thereby enlarging its scope to cover varied target groups with different learning needs in diverse educational environments.
- In order to develop the scientific attitude and to sustain it, it is necessary to define the objectives to be fulfilled through science education by practitioners and policy makers of education. These objectives could also be evaluated by future research studies.

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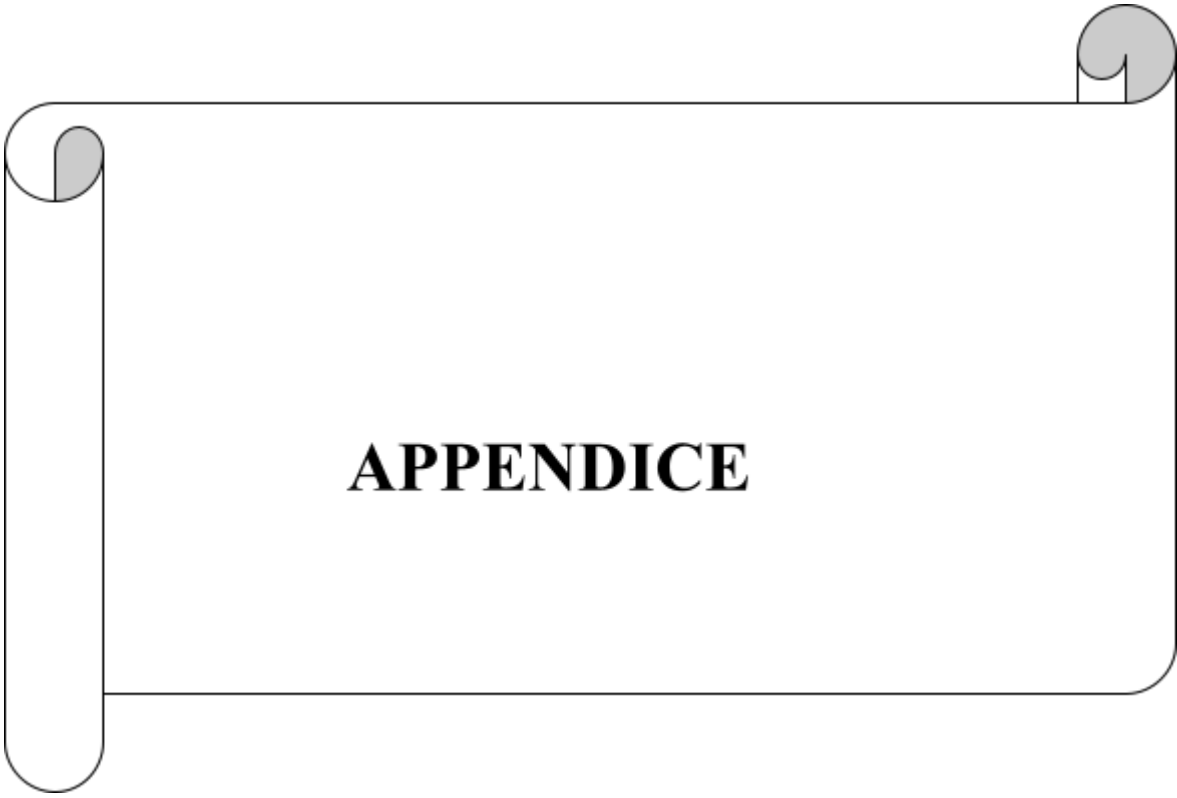
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APPENDICE



Consumable Booklet
of
ATSS-MS
(English Version)

Dr. Savita Mishra (Gangtok-Sikkim)

Please fill in the following entries :

Date

--	--	--	--	--	--	--	--

Name _____

Father's Name _____

Date of Birth

--	--	--	--	--	--	--	--

Gender : Male

☐

Female

☐

Class _____

Area : Urban

☐

Rural

☐

School _____

City _____

Subject Taught : 1. _____ 2. _____ 3. _____ 4. _____

INSTRUCTIONS

On the following pages 75 statements related to learning of Science have been given. Read each statement carefully and decide your answer on any one of the Five alternatives, viz., *Strongly Agree*, *Agree*, *Undecided*, *Disagree* and *Strongly Disagree* and put a ☒ mark in the appropriate cell of alternative which is close to your response.

Answer to all the 75 statements.

Your response will be kept confidential.

Scoring Table

Page	Raw Score						z-Score	Grade	Level of Attitude Towards Science
	3	4	5	6	7	8			
Score									
Total									

Estd. 1938

☎:(0562) 2601080

H. P. Bhargava Book House

LG-1 & 2, Nirmal Heights, Near Mental Hospital, Agra-282 007

St. No.	STATEMENTS	Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Disagree	score
1.	Science is not changing our entire existence.	☐	☐	☐	☐	☐	
2.	Science is a systematized body of knowledge.	☐	☐	☐	☐	☐	
3.	There is no student's activity in science learning.	☐	☐	☐	☐	☐	
4.	Science is a heap of truth.	☐	☐	☐	☐	☐	
5.	Science is the pursuit of knowledge.	☐	☐	☐	☐	☐	
6.	The power of observation of a child is seldom exercised in science reading.	☐	☐	☐	☐	☐	
7.	Science has revolutionized our way of living.	☐	☐	☐	☐	☐	
8.	The release of nuclear energy and "green revolution" is far reaching benefits of science.	☐	☐	☐	☐	☐	
9.	The science curriculum makes inadequate provision for practical and other kinds of activities.	☐	☐	☐	☐	☐	
10.	The agricultural processes have been charged drastically through science.	☐	☐	☐	☐	☐	
11.	Science has been able to diagnose diseases properly.	☐	☐	☐	☐	☐	
12.	Science has proved a cause.	☐	☐	☐	☐	☐	
13.	The industry has been revolutionized by the touch of science.	☐	☐	☐	☐	☐	

Total Score Page 3

Sr. No.	STATEMENTS	Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Disagree	Score
14.	The present is a scientific civilization.	☐	☐	☐	☐	☐	☐
15.	It has worked havoc to the mankind.	☐	☐	☐	☐	☐	☐
16.	Our thinking and way of life have been greatly affected by science.	☐	☐	☐	☐	☐	☐
17.	Age-Old superstitions, taboos are fading away by science.	☐	☐	☐	☐	☐	☐
18.	Science does not encourage us for independent thinking.	☐	☐	☐	☐	☐	☐
19.	Science should be taught as a part of general education.	☐	☐	☐	☐	☐	☐
20.	It has introduced us to new ways of thinking and reasoning.	☐	☐	☐	☐	☐	☐
21.	Science does not help to inculcate scientific attitude among pupils.	☐	☐	☐	☐	☐	☐
22.	Science includes a spirit of enquiry.	☐	☐	☐	☐	☐	☐
23.	Science has shortened the world.	☐	☐	☐	☐	☐	☐
24.	It leaves an insufficient basis of sound fundamental principles.	☐	☐	☐	☐	☐	☐
25.	Science prepares pupils for various professions.	☐	☐	☐	☐	☐	☐
26.	Science cannot be neglected from the school curriculum.	☐	☐	☐	☐	☐	☐
27.	Text books on science are not easily available.	☐	☐	☐	☐	☐	☐

Total Score Page 4

Sr. No.	STATEMENTS	Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Disagree	Score
28.	Every man of Science has passion for truth.	☐	☐	☐	☐	☐	
29.	The discovery of the mysteries of nature is the concern of science.	☐	☐	☐	☐	☐	
30.	The science book does not follow the aims of Science teaching.	☐	☐	☐	☐	☒	
31.	The teaching of science develops scientific attitude among pupils.	☐	☐	☐	☐	☐	
32.	Science can aid in education for the wise use of natural resources.	☐	☐	☐	☐	☐	
33.	The material given in the book does not conform to the prescribed syllabus.	☐	☐	☐	☐	☒	
34.	Improvisation in science is an inspiration in young children to explore/discover and invent new things.	☐	☐	☐	☐	☐	
35.	Science clubs inculcate a scientific attitude among us.	☐	☐	☐	☐	☐	
36.	The average span of life has been doubled through science.	☐	☐	☐	☐	☐	
37.	Science fairs provide opportunities to students to witness the achievement of their colleagues.	☐	☐	☐	☐	☐	
38.	Science helps in development of physical and mental health of individuals.	☐	☐	☐	☐	☐	
39.	It provides a unique training in truth.	☐	☐	☐	☐	☐	
40.	It develops neat and orderly habits.	☐	☐	☐	☐	☐	
Total Score Page 5							

Sr. No.	STATEMENTS	Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Disagree	Score
41.	It renders very useful services to mankind.	☐	☐	☐	☐	☐	
42.	Science trains the mind of the people.	☐	☐	☐	☐	☐	
43.	Science increases the capacity to know the unknown.	☐	☐	☐	☐	☐	
44.	Science has a cultural value.	☐	☐	☐	☐	☐	
45.	Science club forms the back-bone of co-curricular activities of the school.	☐	☐	☐	☐	☐	
46.	Science is the only subject which offers the pupils a large number of activities.	☐	☐	☐	☐	☐	
47.	Dignity of labour is developed through improvisation in science.	☐	☐	☐	☐	☐	
48.	Our attitude towards religion has deteriorated by science.	☐	☐	☐	☐	☐	
49.	Science is not finding a respectable place in Secondary School Curriculum.	☐	☐	☐	☐	☐	
50.	In science, syllabi are covered in a short time.	☐	☐	☐	☐	☐	
51.	Science gives the children superficial knowledge of many things.	☐	☐	☐	☐	☐	
52.	Experimental work is neglected in science learning.	☐	☐	☐	☐	☐	
53.	I have no interest in science as there is no science club in our school.	☐	☐	☐	☐	☐	
54.	The form of presentation is not satisfactory through out the book.	☐	☐	☐	☐	☐	

Total Score Page 6

St. No.	STATEMENTS	Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Disagree	Score
55.	We are not provided with charts, pictures, models etc. in the classroom teaching.	☐	☐	☐	☐	☐	
56.	I think being a scientist would be exciting.	☐	☐	☐	☐	☐	
57.	I would rather listen to someone talk about science than read a science book.	☐	☐	☐	☐	☐	
58.	I like to watch TV shows about science.	☐	☐	☐	☐	☐	
59.	I think science is important only at school.	☐	☐	☐	☐	☐	
60.	I would rather use computers to learn about science than read a science book.	☐	☐	☐	☐	☐	
61.	Science tests are easier than other tests.	☐	☐	☐	☐	☐	
62.	I learn more from doing experiments than from listening to the teacher's explanations.	☐	☐	☐	☐	☐	
63.	Science is fun.	☐	☐	☐	☐	☐	
64.	I like to use science equipment to study science better than reading science books.	☐	☐	☐	☐	☐	
65.	I usually try my best in science class.	☐	☐	☐	☐	☐	
66.	If I don't understand a science topic I read more about it.	☐	☐	☐	☐	☐	
67.	I like to figure out something without the teacher telling me how to do it.	☐	☐	☐	☐	☐	
Total Score Page 7							