**CERTAIN DEMOGRAPHIC VARIABLE INFLUENCING ATTITUDE TOWARDS SCIENCE OF SECONDARY SCHOOL STUDENTS OF KERALA**

**ANJUSHA A.M**

**Dissertation**

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****

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**DECLARATION**

I, **ANJUSHA A.M.,** do hereby declare that this dissertation, “**CERTAIN DEMOGRAPHIC VARIABLE INFLUENCING ATTITUDE TOWARDS SCIENCE OF SECONDARY SCHOOL STUDENTS OF KERALA”** has not been submitted by me for the award of any Degree, Diploma, Title or Recognition before.

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**CERTIFICATE**

I**, Dr. ASEEL ABDUL WAHID,** do here by certify that the dissertation entitled **CERTAIN DEMOGRAPHIC VARIABLE INFLUENCING ATTITUDE TOWARDS SCIENCE OF SECONDARY SCHOOL STUDENTS OF KERALA**  is a record of bonafide study and research carried out by **ANJUSHA A.M.,** of M.Ed Programme (2017-19), under my supervision and guidance, and has not been submitted by her for the award of any Degree, Diploma, Title or Recognition before.

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**Chapter I**

**INTRODUCTION**

* ***Need and Significance of the Study***
* ***Statement of the Problem***
* ***Definition of Key Terms***
* ***Variables of the Study***
* ***Objectives of the Study***
* ***Hypotheses of the Study***
* ***Methodology***
* ***Scope and Limitations of the Study***
* ***Organization of the Report***

“The world we have created is a product of our thinking; it cannot be changed without changing our thinking” -Albert Einstein

Education is an essential human virtue. The chief task of education is to shape man or to guide the developing dynamism through which man form himself as a man. Human life can only be glorified through education. Ideally education is the principal tool of human growth, essential for transforming the unlettered child in to mature and responsible adult.

According to Piaget the principal goal of education is to create men who are capable of doing new things, not simply repeating what other generations have done. To make education an effective one, it must be ensured that every child is nurtured to the maximum possible levels of attainment where the role of a teacher is pivotal. In the context of modern society, the function of education is not an attempt to supply some amount of knowledge to the educant but to develop in him desirable habits, interests, attitudes and skills along with developing physical, intellectual, moral and spiritual power that help him to lead a successful life. A teacher should understand how the child could improve his modes of behaviour in the light of his own reactions and experiences.

We are living in an age of science and technology and the horizon of knowledge is expanding in every seconds. The information superhighway is spreading tremendous amount of knowledge to mankind.The study of science proposes explanations for ‘what is’ in the natural world, where as the study of technology provides solutions to human problems of adaptation. They go together a hand in glove and will have a mounting impact on our social and personal environment. The study of science sharpens our intellect and explores the unknown world and leads to inventions that transforms the world and make life more interesting.

Science is a quest to know the truth by direct perception rather than through a belief system. It is not a magic but is the process of observing, describing, exploring and using the physical world. With the highly developed mind, man can observe precisely, correlate the results of the observation meaningfully and predict future happenings logically. This is the basic of scientific approach and so science can be considered as compounded of curiosity, observation and thought.

According to Jawaharlal Nehru (1956) science made the world jump forward with a leap, built up a glittering civilization, opened up innumerable avenues for the growth of knowledge and added to the power of man to such an extent that for the first time, it was possible to conceive that man could triumph over and shape his physical environment.

Science plays a vital and pivotal role in the development of many qualities of head and heart in the individual, thereby helping him to be a good citizen in the society. It helps him to be useful, productive and progressive member of the society. Science can also develop qualities like truthfulness, honesty, open mindedness and goodness

Science education cultivates student’s curiosity about the world and enhances scientific thinking. Through the inquiry process, students will recognise the nature of science and develop scientific knowledge and science process skill to help them evaluate the impact of scientific and technological developments.

Getting Science education in the 21st century can be very beneficial to children of all ages. Science is what makes up the world and the only way you would be able to know that would be by getting a real education in the studies of Science. There are many reasons in why getting an education in Science can be important. Some of them are that makes you smarter, it increase your awareness of diseases going around in the world, and getting a proper education in Science can inspire kids to be scientists themselves.

Students aspiration to study Science is strongly associated with their extrinsic motivation towards Science, their intrinsic interest in Science and their engagement in academic activities. More over the students’ confidence in their own abilities in Science is a major factor determining performance in Science.

Science education at school level is important because of its four dimensions as suggested by UNESCO. Firstly, for the foreseeable future, science has a key role to play in helping reduce inequalities. Without a basic science education, people are unable to participate fully as citizens. The second dimension is that basic school science introduces students to one of the great achievements of the modern world. It also makes a particular contribution to developing powerful ways of thinking within science and, more importantly, beyond science. Students begin to acquire a valued and valuable part of culture. Thirdly, in the world of work, basic school science increases the freedoms to choose a wider range of careers, careers that are more financially and personally enriching. The fourth dimension is increasing globalization. This brings with it challenges, potentials and possibilities; to better meet these, students need at least a basic science education.

This explores how these four dimensions can be related to teaching and learning in the classroom to outline a new vision of school science for basic education. We propose substantial developments in the science that students learn in school, with implications for teachers, policy makers and governments. We propose a humanistic school science that will challenge educational systems, not so much in the content of the curriculum but in the way that learning in schools is brought about. We can see parallels with the proposals developed in the accompanying mathematics document. While such changes are challenging, we hope to show that the advantages of these approaches will be such that school science can help meet the challenges ahead. This basic science education will contribute to a more equitable world, where students are prepared to achieve their potential, to contribute to society; students are introduced to powerful ways of thinking about the world. They are prepared to take their full place in that world and to change their worlds for the better.

An analysis of 10th Standard results of 2018 of CBSE (Central Board of Secondary Education) reveals that the score Obtained by the students in Science is very low compared to other subjects. This fact is really shocking to the Science community and throws light to the need of more efforts to improve students’ performance in Science. Receiving an education in Science is good for children of all ages. Educational studies in Science can be making a student more wise or sharp.

Science education in India is faced by practical challenges today, one of them was quality of science education.Quality of science education is a solution for the problems of the country like financial crisis and its effects. Its importance cannot be overlooked in under developed and developing countries. The need for sufficient level of scientific literacy and the necessity to improve the quality of science instruction in school has been identified by the academics even at a global level. Generally, improvement attempts focus on science subject matter, students learning needs and capabilities. Education system implicitly as well as explicitly accept that part of its role is to prepare children for the world of work, for which the affective and motivational aspects of Science learning are to be considered in the class room and in the wider society.

In order to improve the quality of science education, NPE (1986) has suggested several measures. These include activity based learning, increase in laboratory work, fields trips and projects for developing the attitude and interest in science. It is hoped that these steps would be helpful in increasing the interest and achievement levels of school students. In addition to the measures suggested above, integration of technology is one such measure for the improvement of science teaching which has been suggested by both NPE (1986) and NKC (2009)

**Need and Significance of the Study**

Out of all educational levels, secondary education serves as a link between the elementary and higher education for an individual. Thus, it plays a very important role as a child's future would depend a lot on the type of education he/she receives at the secondary level. Apart from strengthening the roots of education of a child, secondary education can be instrumental in shaping and directing a child to a bright future. The National Policy on Education (NPE, 1986) has called for strengthening secondary education by providing environmental awareness and science and technology education. As succinctly observed in the National Policy Document;

“Science education will be strengthened so as to develop in the child well defined abilities and values such as the spirit of enquiry, creativity, objectivity, the courage to question, and aesthetic sensibility. Science education programmes will be designed to enable the learner to acquire problem solving and decision making skills and to discover the relationship of science with health, agriculture, industry and other aspect of daily life”

Attitude towards Science is one of the major concerns in Science education which could be influenced by many factors that includes perception of Science teacher, teaching style, learning environment, motivation towards Science, enjoyment in Science and attitudes of friends or classmates.

Learning of Science requires positive attitude towards science which in turn helps to bring out achievement in Science. Attitude has a greater place in child’s dictionary because it is related to his/her academic performance greatly. Without correct attitude one cannot withstand in the educational world. But it observed that there is a trend of decreasing interest in science among students across the world is a big challenge. The decrease in science interest, Science careers in primary and secondary schools is well documented by many studies (UNESCO).

Many students at higher secondary level share their mind as why should one continue studying Science subjects when there is scope for interactive , interesting and less difficult subjects *(Staff reporter, The Hindu. July 4, 2018)*. The need to target children and young adults and to increase their interest in Science as a subject to pursue a career cannot be ignored.

Science gives pupils the means required to enhance their understanding of the world around them. It encourages curiosity and a critical outlook. It throws light on the relation between human beings and nature and reminds us that natural resources are finite and very precious. Science pervades all spheres of activity around us. We are surrounded by its products, from an audio player through digital instruments to computers. We all need a scientific culture for our survival into this fast growing world (Eurydice European Unit, 2006).

The science is important from practical point of view. A person may belong to high or low class of the society but he utilizes the knowledge of science in one or another form. By developing a positive attitude towards science, students can meet the challenges of technological developments. By developing a positive attitude, the students can distinguish between right and wrong as these get developed through science and by developing a favourable attitude the qualities like truthfulness, honesty, purity of thought, cleanliness, justice and self control gets developed in the students. Science is helpful in developing all our intellectual powers like power of imagination, memorization, observation, invention, concentration, creativity, logical thinking systematized reasoning and skills.

The secondary school students are the immediate group who have to decide on the future stream of study, whether science related or not. This lead the investigator to take secondary school students are the sample of the study.

The present study aims to analyse the influence of demographical variables like gender, locale, board of education, and family income on attitude towards science.

**Statement of the Problem**

The researcher in her study used the demographical variable as the independent variable and attitude towards Science as the dependent variable is the attitude towards science of secondary school students of Kerala. The investigator believes that the demographic variables like gender, locale and type of board of education may influence to develop a positive attitude towards Science. Hence the present study is an attempt to get a clear picture of the influence of these demographic variables in the development attitude towards science and the problem is stated as “Certain Demographic Variables influencing attitude towards science of secondary school students of Kerala”.

**Definition of Key Terms**

**Demographic variables**

A demographic variable means the personal information about the participants like income level, gender, educational level, ethnicity, race, and family size. The demographic variables that will be used in the present study are gender, locale, and type of board of education.

**Attitude towards Science**

According to Thurston (1967) attitude is the “sum total of a man’s inclinations and feelings, prejudice or bias, preconceived notions, ideas fears, threats, and convictions about any specified topic.

In the present study attitude towards Science is based on students anxiety towards Science, the values of science, motivation towards science, enjoyment of science, attitudes of peers and friends towards science, attitude of parents towards science, the nature of class room environment, achievement in science, fear of failure on science etc.

**Influence**

According to the Oxford dictionary, the term ‘influence’ means the action or process of producing effects on the actions, behavior, opinions etc of another or others. But the term ‘influence’ in the study stands for the statistical process to see whether the influence of a variable makes a difference upon another variable. In the present study, the term influence represents the demographic variables and its influence upon the attitude towards science of secondary school students.

**Secondary School Science**

Students studying in standards VIII, IX and X of Kerala are considered as secondary school students.

**Variables of the Study**

In this study two variables are included, one independent and other dependent.

Demographical variable such as gender, locale and type of board of education are considered as the independent variable and attitude towards science is the dependent variable.

**Objectives of the Study**

The following are the objectives of the study

1. To find out the extent of attitude towards Science among secondary School students of Kerala.

2. To find out the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To compare the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To study the interaction effect of gender, locale and type of board of education on attitude Towards Science on secondary school students of Kerala.

**Hypotheses of the Study**

The following is the hypotheses formulated for the present study.

1. There is no significant difference in the mean scores of Attitude towards Science between male and female secondary school students

2. There is no significant difference in the mean scores of Attitude towards Science between urban and rural secondary school students

3. There is no significant difference in the mean scores of attitude towards Science between state and CBSE school students.

4. There exists significant interaction effect of the independent variables gender, Locale, type of board of education on the dependent variable attitude towards science of secondary school students of the total sample

**Methodology**

The procedure adopted for the research study is described below.

**Sample**

Population under study is secondary school students of Kerala. A sample of 691 students belongings to five districts of Kerala such as Kozhikode, Kannur, Malappuram, Wayanad and Kollam. Stratified sampling method was used for collecting the data.

**Tools Used**

A scale of Attitude towards science developed by the investigator and her supervising teacher (Anjusha & Dr. Aseel Abdul Wahid) were used to measure attitude towards Science of secondary school students.

**Statistical Techniques Used**

The following statistical techniques such as descriptive statistics, test of significance (t-test) and three way ANOVA were used for analysing the data.

**Scope of the Study**

The present study is an attempt to find out the influence of Demographical variable such as gender, locale, and type of board of education on Attitude towards Science. The appropriate tool was constructed by the investigator with the help of the supervising teacher for the study.

Science education has gained tremendous importance among students in India. Science is the back bone of human existence. Apart from strengthening the roots of education of a child, secondary education can be instrumental in shaping and directing a child to a bright future. So the investigator believes that the findings of the study will be beneficial to both students and teachers. Resourceful activities suitable for developing creativity in students should be included in the science curriculum. . The science is important from practical point of view.

By developing a positive attitude towards science, students can meet the challenges of technological developments. The educational planners and curriculum makers are very useful for making a positive attitude towards science. By developing a favourable attitude towards science the teachers can inculcate the qualities like truthfulness, honesty, purity of thought, cleanliness, justice and self control gets developed in the students. Can eliminate the difference between rural and urban students attitude towards science.

Though the investigator will make the study precise, there are some unavoidable limitations.

**Delimitations of the Study**

The study encounters certain delimitations; a vast area generally does not yield satisfactory results when it has to be completed within a stipulated period. Therefore, taking into consideration the time in available, the present study is delimited in terms of scope, area and sample. The following are the delimitations of the study.

* + 1. In the present study, the demographic variables like gender, locale and type of management category were only considered; other demographic variables may also influence on the development of attitude towards science.
    2. The study concentrated on secondary pupils only. It is restricted to the pupils of 8, 9 and 10th only.
    3. The sample selected for the study is not a state-wide one. It is confined to five districts of Kerala namely Kannur, Waynad, Kozhikode, Malappuram, and Kollam.
    4. The issue is relevant for the entire schools of the country. But the investigator limited the study on the secondary school students of Kerala and CBSE streams and couldn’t include students from other board of education like ICSS.

The time limit was main obstacle to increase the number of samples of the study inspite of all these limitations the investigator expects that the result obtained will be reliable and have a generalised nature. It is also believe that the findings of the study will help to bring about clear picture of relationship between Demographical variable such as Gender, Locale and Board of education and attitude towards secondary school students of Kerala.

**Organisation of Report**

The present study comprises of 5 chapters viz. Introduction, review of related literature, methodology, analysis, summary, conclusion and suggestion.

***Chapter I* Presents a brief introduction to the problem, need and significance of the study, statements of the problem, operational definition of key terms, objectives of the study by describing sample selected, method adopted, tool employed, statistical techniques used and scope and limitations of the study.**

***Chapter II* Deals with the theoretical framework regarding school social system and student engagement and summary of the reviewed empirical studies done in the areas of school social system and student engagement at secondary schools.**

***Chapter III* The methodology of the study is described in detail consisting of the variables, objectives, hypotheses of the study, the selection of the sample, data collection, tools used to collect data and statistical techniques used for analysis of data.**

***Chapter IV* Deals with the statistical analysis of the data collected for the study, discussion of results and findings of the study.**

***Chapter V* gives the summary of the study, major findings, conclusions, educational implications of the study and suggestions for further research in this area.**

**Chapter II**

**REVIEW OF   
RELATED LITERATURE**

* **Theoretical Overview of Attitude towards Science**
* **Studies Related to Attitude towards Science**
* **Conclusion**

**REVIEW OF RELATED LITERATURE**

**Introduction**

Review of Literature is the written summary of journal articles, books and documents that describe previous work done in the area of Interest of the researcher. It is an important aspect of any investigation. It helps in learning new ideas on how other researchers have conducted their studies. The major purposes of reviewing the related literature included enable the researcher to define the limits of the study, understanding the research methodology and avoiding duplication of the previously established findings.

The present study is an attempt to find out the influence demographic variables and attitude towards science of secondary school students of Kerala. To have an understanding of the nature of study in this area the researcher has gone through relevant literature both theoretical and empirical. The review has been presented under the heads conceptual overview and review of related studies.

**Section 1**

**Conceptual Overview**

**Concept of Attitude**

The main aim of education is to modify the behaviour of a child according to the needs and expectancy of the society. Behaviour is composed of many attributes. One of these important attribute is attitude. One’s behaviour, to a great extent, depends upon one’s attitude towards the things idea, person, or object in his environment. The entire personality and development of a child is influenced by the nature of his attitudes. Learning of a subject and acquisition of habits, interests and other psychological disposition are all affected by his attitude.

**Definition and Meaning of Attitude**

The Dictionary meaning of Attitude is settled behavior as indicating opinion. Thurston (1928) has defined as “attitude is the sum total of man’s inclination, feelings, prejudice or bias, preconceived notions, ideas, fears, threats and convictions about any specific topic”.

Attitude is a susceptive and personal affair. The term opinion symbolizes an attitude. In fact it is the verbal expression of attitude.

Apart from these terms attitude has been defined by different authors. A few of these definitions are

An attitude is a readiness to respond in such a way that behavior is given a certain direction. (Traverse)

* We define an attitude on an organization of concepts, beliefs, habits and motives associated with a particular object.(Meckeachi and Doyle)
* An attitude is a particular feeling about something. It therefore involves a tendency to behave in a certain way in situation which involve that something. Whether person, idea or object. It is partially rational and partially emotional and is acquired, not inherent, in an individual.( Sorenson)
* An attitude is a predisposition or readiness to respond in a pre determined manner to relevant stimuli(Whilttaker).

According to the first definition attitude is responsible for behaving in a particular and a definite way. If one keeps a positive and favorable attitude towards an object, he will be attracted towards it, he will admire it and try to achieve it. On the other hand, If one has negative or unfavorable attitude one will try to avoid it and ever feel hostile towards it.

The second definition takes into account all the concepts, beliefs, habits and motives associated with the object. The concepts and beliefs associated with an attitude are often referred to as the cognitive component of attitude, the habits as the action component, and the motives as the affective component. In this way all that are then feel and the way one reacts expresses one’s attitude towards an object.

The third definition explains why an individual behaves in a certain way when he is needed to respond to the particular objects for which he has developed a positive or negative attitude. He has an almost definite set of feelings, like or dislikes for that object as they partly stand on rational and partly on emotional footing. But in all the cases they are acquired and learned through varying experiences.

The last definition accepts attitude on a pre disposition or tendency to behave in a particular and definite way to a particular situation one’s attitude decided one’s response to a particular stimulus.

From the above definitions we may understand attitude as a determining acquired tendency which prepare a person to behave in a certain way towards a specific object or a class of objects subject to the conditions prevailing to the environment.

**Nature or Characteristics of Attitude**

Attitude has several important characteristics namely these

*Attitudes have a Subject-Object Relationship*

Attitudes always involve the relation of an individual with specific objects, persons, groups, institution and values or norms related to his environment.

*Attitudes are Learned*

Attitudes are learned and acquired dispositions. They are not innate and inherent in an individual. Consequently they may be differentiated from physiological motives.

*Attitudes are reactively enduring states of readiness.*

Attitude represents the state of readiness to respond to a certain stimulus. Physiological motives also do the same.

*Attitudes have motivational-affective characteristics***.**

Attitude has definite motivational characters. Other dispositions like habit of writing with right hand do not have any motivational or affective quality, but attitude towards one’s family, nation, religious or other sacred and hallowed imitates have definite motivational affective characteristics.

*Attitudes are as numerous and varied in the stimuli to which they respond.*

Attitude is an implicit response; therefore it stands to be varied with the number and variety of the responses which the individual makes. The change in environment and the situation further bring variety in the expression of these attitudes. Therefore it is correct to say that attitudes are as numerous as the object towards which they are directed and the situation in which they are expressed.

*Attitude range from strongly positive to strongly negative.*

Attitudes involve direction as well as magnitude. When a person shows some tendency to approach an object he is said to have positive attitude towards it, but when he shows tendency to avoid the object, the attitude is described as negative. These positive or negative attitudes may involve intense feeling and vary from the large negative value to the increasingly positive.

**Formation of Attitude**

Attitudes are learned or acquired dispositions. Based on the opinion of Allport, Stagner has suggested that attitudes are formed under one of the following four conditions.

*Integration of experiences*

The accumulation and integration of a number of related experiences about an object given birth to an attitude towards that object.

*Differentiation of experiences*

When new experiences are acquired they are differentiated or segregated from the already acquired experiences. The segregation or differentiation may tend to make certain attitudes more specific.

*Trauma of dramatic experiences*

Attitudes are formed with greater speed and intensity on account of sudden unusual shocking and painful experiences.

*Adaptation of the available attitudes*

A large number of attitudes are acquired in a readymade fashion by simply following suggestions or explanation of friends, teachers, parents or adopting the mores and tradition of the community or society.

**Factors Influencing the Formation or Development of Attitudes**

Attitude is unquestionably an acquired disposition and therefore conditioned by learning or acquisition of experiences. Here daily factor does not play any role in the formation or development of attitudes. Environment forces helps an individual to form and develop attitudes. An attitude at any stage is initially a product of the interaction of one’s self with one’s environment. Therefore the factors influencing the formation and development of attitudes can be divided into two parts.

i. Factors within the individual himself.

ii. Factors within the individual environment

*Factors within the Individual Himself*

All individual do not respond similarly to the same situations. The effect of environmental stimuli in acquiring some predispositions is very much conditioned by the growth and development pattern of the individual of the child.

The development factors are given below:

* Physical Growth and Development
* Intellectual Development
* Emotional Development
* Social Development
* Ethical or Moral Development

*Factors within the Individual Environment*

Besides the individual variations shown by their various personality characteristics on account of the pattern of their growth and development attitudes are largely borrowed from the groups within one’s environment to which one owes one’s stronger commitment.

Important environment factors are:

i. Home and family

ii. Social environment

**Home and family**

In attitude formation home and family environment plays a leading role. A child identifies himself with his parents and other members of the family picks up their attitude. The family more or less defines for the child the expected role for which he must play in various situations and thus initiates the formation of specific attitudes.

**Social environment**

While the home and family environment plays its role in the formation of early attitude, contact with the people in neighborhood, school, community and society and mores and traditions of the community to which one belongs, cast strong influencing in reshaping early attitudes and acquisition of many more attitudes.

**Theories of attitude formation and change.**

***A) Functionalist theory***

Daniel Katz proposed a functionalist theory of attitudes. He takes the view that attitudes are determined by the functions they serve for us. People hold given attitudes because these attitudes help them achieve their basic goals. Katz distinguishes four types of psychological functions that attitudes meet.

**i. Instrumental -** we develop favorable attitudes towards things that aid or reward us. We want to maximize rewards and minimize penalties. Katz says we develop attitudes that help us meet this goal. We favor political parties that will advance our economic lot - if we are in business, we favor the party that will keep our taxes low, if unemployed we favor one that will increase social welfare benefits. We are more likely to change our attitudes if doing so allows us to fulfill our goals or avoid undesirable consequences.

**ii.  Knowledge** - attitudes provide meaningful, structured environment. In life we seek some degree of order, clarity, and stability in our personal frame of reference. Attitudes help supply us with standards of evaluation. Via such attitudes as stereotypes, we can bring order and clarity to the complexities of human life.

**iii**. **Value-expressive** - Express basic values, reinforce self-image. EX: if you view yourself as a Catholic, you can reinforce that image by adopting Catholic beliefs and values. EX: We may have a self-image of ourselves as an enlightened conservative or a militant radical, and we therefore cultivate attitudes that we believe indicate such a core value.

**iv.** **Ego-defensive** - Some attitudes serve to protect us from acknowledging basic truths about ourselves or the harsh realities of life. They serve as defense mechanisms. EX: Those with feelings of inferiority may develop attitude of superiority.

Katz's functionalist theory also offers an explanation as to why attitudes change. According to Katz, an attitude changes when it no longer serves its function and the individual feels blocked or frustrated. That is, according to Katz, attitude change is achieved not so much by changing a person's information or perception about an object, but rather by changing the person's underlying motivational and personality needs.

**B) Learning theory** (which stresses attitude formation). There are several means by which we learn attitudes.

**i. Classical conditioning.**

Classical conditioning (also known as Pavlovian conditioning) is learning through association and was discovered by Pavlov, a Russian physiologist. In simple terms two stimuli are linked together to produce a new learned response in a person or animal.

**ii).  Instrumental, or operant conditioning**.

Operant conditioning is a method of learning that occurs through rewards and punishments for behavior. Through operant conditioning, an individual makes an association between a particular behavior and a consequence (Skinner, 1938).

**iii. Observational learning*.***

**Observational learning,** method of learning that consists of observing and modeling another individual’s behavior, attitudes, or emotional expressions. Although it is commonly believed that the observer will copy the model, American psychologist Albert bandura stressed that individuals may simply learn from the behavior rather than imitate it. Observational learning is a major component of Bandura’s social learning theory. He also emphasized that four conditions were necessary in any form of observing and modeling behavior: attention, retention, reproduction, and motivation.

**C)  Cognitive dissonance theory**

The theory of cognitive dissonance has been the subject of interest and study of social psychologists in particular. Leon Festinger, one such noted social psychologist, explained that people, in the course of their daily lives, hold a myriad of cognitions simultaneously. Many of these cognitions are irrelevant to each other and are not problematic for the individual. Sometimes, cognitions are complementary and are in consonance with each other, again, not causing any conflict for the individual.

If cognitions support the attitude and the behaviour, the individual’s chances of repeating and maintaining the behavior are high. It is thus very likely that the individual will continue to eat hotdogs because his notion that eating hotdogs can provide him with protein that his body needs reinforces his desire for smoking. The link between the attitude and the behaviour, therefore is strengthened by the compatible cognition.

Cognitive dissonance, as is a state of psychological tension or discomfort that occurs when an individual experiences an inconsistency between an attitude and a behaviour or some novel piece of information, causing the individual to hold conflicting beliefs, values or emotions simultaneously. This dissonance, as generated by inconsistencies and discrepancies in cognitions, is similar to the experience of anxiety.

As a result, the individual may feel embarrassment, guilt, anger, and a variety of other usually unpleasant emotions. Cognitive dissonance drives the individual to change any one of the components that are responsible for the discrepancy, be it the attitude, the behavior or the individual’s perception of the information, with the objective of eliminating the discrepancy and the tension that accompanies it.

The theory of cognitive dissonance is therefore an example of a drive-reduction theory in which a change in attitude is reinforced or strengthened by the reduction of an unpleasant emotional stimulus or drive. Festinger further discussed “dissonance reduction” which is the process people go through in order to establish consonance among the elements.

**Section II**

**Studies Related to Attitude Towards Science**

Lalmuanzuali. et.al. (2019)worked onScience Achievement and Attitude towards Science among Higher Secondary School Students of Aizawl City. The main objective of the this study is to explore students‟ achievement in science and their attitude towards science. The study also tries to find out the relationship between science achievement and attitude towards science among higher secondary science students of Aizawl. Mizoram. Altogether, 300 students,(150 males, and 150 females) were randomly selected for the study. Data on attitude towards science was collected through, Science Attitude Scale‟ developed by the researcher. Results indicate that no significant difference was found in the attitude towards science with respect to gender but boys were found to possess significantly higher in science achievement as compared to girls. No significant correlation was found between attitude towards science and science achievement

Rattana and Praveena (2018) studied about attitudes towards science and academic achievement secondary school students. The population included grade students a total of 38 students (8 girls and 30 boys). The research instrument was the Persian translation of the Science Education questionnaire. Results indicated that there is no significant difference between boys and girls attitude towards of science secondary school student. There is no significant difference between boys and girls academic achievements of science secondary school students. There is no significant relationship between attitude towards science and academic achievement

Ozden (2017) studied about elementary students’ attitude towards Science. He examined whether the attitude of elementary school students towards Science are varied according to certain variables. Survey method was used for the study, and cluster sampling strategy was utilized to recruit participants. The total sample of the study was 1041 elementary school students. Science and technology course Attitude Scale was used to collect the data. The results showed that the elementary school students have positive attitude towards Science. Female students, students from urban schools, and students that want to occupy in Science related jobs in their future have significantly higher scores than their counter peers.

Reddy (2017) explores that gender difference in attitudes to learning Science in grade 7. This study reflects on the nature of the learners’ attitude towards Science and the effect of gender. The sample used for the study was 547 grade 7 learners from urban districts of Gauteng province (South Africa). The tool used for the study was questionnaire consisting of 15 questions. Learners were requested to indicate their degree of agreement or disagreement to each of the questions, on a five point Likert scale of evaluation. The result showed that in terms subject preferences, boys were more inclined to study Physics and Chemistry but girls had a higher preference for Biology and Astronomy.

Yamtinah *et. al.* (2017) conducted a research on gender differences in students’ attitude towards Science, a analysis of students’ Science process skill using testlet instrument. The purpose of this study are to analyse gender differences in students’ attitude towards Science and to investigate how they are vaned by Science process skill indicators. The sample of the study is 109 male and 117 female students of 3 different schools, were examined using testlet instrument. Testlet instrument consists of 30 multiple choice questions. The results of the study showed that male and female students show similar attitude towards Science process skill indicators. However male students show better results than female students especially at observation, controlling variable and making conclusion. But female students are better at conceptual knowledge and interpreting data.

Hacieminoglu, E. (2016) studied Elementary School Students’ Attitude toward Science and Related Variables. this study is to determine the relationships among the seventh grade elementary students’ attitudes toward science, their learning approaches, motivational goals, science achievement and students’ nature of science. The questionnaires for this study were administered online to 3,598 seventh grade students in different regions and cities of Turkey. The convenience sampling method was used in this study. The correlation results revealed the positive relationship between attitude toward science and the other variables. Multiple regression analysis indicated that while students’ meaningful learning, self-efficacy, and nature of science views have a positive contribution, rote learning contributed negatively to the model. The findings also showed that parents’ income and education level had a significant effect on students’ attitude towards science.

Sethi (2015) conducted a study on attitude of the students towards Science in relation to certain non-school factors. She adopted a sample of 100 students. The main findings of the study were that significant difference exists between urban and rural students. Urban students have more favourable attitude towards Science in comparison to rural students. There is no significant difference between the attitude of boys and girls. Gender does not affect the attitude of students towards Science.

Ali, Iqbal and Akhtar. **(2015**) studied about students’ attitude towards Science and its relationship with achievement score at intermediate level. The sample comprised of 3960 intermediate Science students selected from different higher secondary schools and colleges in the province of Punchab, Pakisthan. An Urdu translation of the test of Science related attitude can used to measure the Science related attitude of students.

Afari (2015) studied the relationship of students’ attitude towards science and academic achievement. Sample of the study were collected from Abudhabi. A convenient sample of 352 students from 33 classes participated. Of the 352 students’ 121 were males and 231 were females ranging an age from 18 years to 24 years. The findings suggest that student’s attitude towards the learning of science and their academic achievement in science was positively correlated at0.1 level. He also investigated that the correlation between students attitude towards science and academic achievement for male and female students. The result revealed that there was a statistically positive significant difference enjoyment of science lesson and achievement for male and females. But there was no statistically significant difference in the strength of the correlation between academic efficiency and achievement for male and females.

Singh and Imam (2014) explored the effects of gender, attitude towards Science, parental education and family size on Science achievement. The sample of the study was 2006 students, 1080 males and 926 females from 21 schools of central UP. Science Attitude Scale, Science Achievement Test and personal and environmental background assessment questionnaire were used for data collection. The result shows that there was a significant difference between Science achievements of boys and girls. The male have greater access to Science and technical fields, and greater earning power than females. The result analysis also shows that The parental education is positively correlated with the Science achievement of the students. The family size of the students was positively associated with the Science achievement of the students. Children from highly educated parents are likely to have significantly higher Science achievement scores as compared to the children of less educated parents.

Ali and Awan (2013) conducted a study to examine the relationship of attitude of secondary school students towards Science with the achievement in the subjects of Physics, Chemistry, Biology and Mathematics. The data collected from 1885 students of 10th grade students. The result of the study indicates that attitude towards Science had significantly positive relationship with the achievement of Science students at secondary level.

Narmada and Chamundeswari (2013) conducted a study to investigate attitude towards learning of Science and academic achievement in Science among students of secondary level. The sample of their study was 422 secondary level students in different systems of education, namely state, matriculation and central board school. Random sampling techniques were used by them for taking sample. Attitude towards learning of Science scale used to measure the attitude towards Science. The results shows that the students from central board school performed better in Science subject compared to the students from state, and matriculation board school at the secondary level.

Shah, Mahmood and Harrison (2013) has been conducted an exploration of Pakisthani students on attitude towards Science learning. The purpose of the study was to explore the Pakisthani students’ attitude towards Science learning. Participants of the study was 1233 students of 37 Government schools of 3 districts. The result of the study reflects that attitude towards Science learning increases with the increase in grade of students, and the female students had higher attitude towards Science learning, than male students. Parental education, occupation and students’ locality, family size, private tuition did not affect the attitude towards Science learning.

Sofiani, D. *et. al*. (2013) investigated the students’ attitude towards Science and the effect of gender on students’ attitude. A total of 77 secondary school students participated in this study. They were selected randomly from various schools in Indonesia. The attitude questionnaire consists of 23 items related to 4 dimensions enjoyment, self confidence, value and motivation were used for data collection. The results showed that students’ positive attitude towards Science was at medium level and there was no significant difference in attitude towards Science between the female and male students.

Akpinar and Ergin (2009) made an investigation on the influence lf gender and grade level on students’ attitude towards Science and technology and their academic achievement. The purpose of the study was to examine differences by gender and grade level in primary school students’ attitude towards Science and technology and academic achievement. The sample of the study were 658 primary school students. A ‘personal information forum’ and Attitude Scale for Science and Technology (ASST) were the tools used for the study. The findings of the study showed that there were significant difference between female and male students in terms of ‘interest in Science’ in favour of female. There were no significant gender differences in terms of another factor ‘enjoyment of Science experiments’ respectively. There were significant differences among students’ grade level towards Science and technology in terms of four factors. Besides, significant positive correlation were found between ASST and academic achievement.

Samal (2012) studied parents attitude towards schooling and education of children. They analyzed data from 145 parents, who has one or more than one school going children. 116 parents were from tribal families, 29 from non-tribal families. The age of parents was taken as 25-35 years. 23 item questionnaire was used for collecting the data. The findings showed that the overall attitude of the respondents moderately favourable and positive towards schooling and education of their children. The result also indicates that there was no significant difference in the attitude of tribal and non-tribal parents. Gender difference was also found to be non-significant.

Mohammad, et.al. (2012) conducted research on students attitude towards Science and Technology. The study assessed the students attitude towards Science and technology of middle school . The population of the study are 3rd grade students total number of 230 students. 105 females and 125 males. Stratified random technique of Sampling is used. Research instrument was the Persian translation of the science education questionnaire. Reliability of the scale calculated by Cronbach's Alpha coefficient (.91). The result indicates that there is a positive attitude towards Science and Technology among students. However there was not a positive attitude towards some items of Science and Technology. Result also showed that there is a meaningful difference between male and female point of view in attitude towards Science and Technology. According to this result males have a higher average than females. The result of the research provides important information about students attitude towards science and could be it used by some teachers and educated to development of science curriculum and science book.

Cokadar and Kulce (2008) conducted a study to understand pupils’ attitude towards schools Science. They used the questionnaire for a sample of 503 pupils of six public schools in the city of Aydin, in Turkey. The first section of the questionnaire contains demographic information and in the second section they were given a scale to measure their attitude towards school subjects, instruction and Science in three sub divisions. According to the result of the study pupils’ attitude towards Science were found at medium level. Pupils’ favorite subject, attended school grade, family’s monthly income and perception of self achievement related to the pupils attitude towards Science. The pupils’ attitude towards Science differs depending on pupils’ favorite subject, attending school, grade, family’s income and perception of self achievement. There were no significant differences at the pupils’ attitude towards Science relating to gender, parents’ educational background and job and social self perception of the pupil.

Yang and Chang (2008) studied about the potential influence of parents attitudes towards education. On their children’s daily life and their development in Korea. Qualitative methodology they used for their study. A sample of 34 with an in depth semi structured interview they adopted. The findings of the study suggested that the parents desire for their children’s educational success is profound and it has a huge impact on their actual behaviour towards their children. All the parents placed a great importance on their children academic achievement as a means to acquire personal advancement, higher social status, and wealth. But they overlooked their children developmental needs such as leisure, pleasure, and sleeping. Their psychological and emotional wellbeing tends to be ignored.

Miller, Blessing and Schwartz (2006) studied about gender differences in High School students views about Science. They examined gender differences in 79 high school students’ attitude towards their Science classes, their perceptions of Science and scientists and their views about majoring in Science. The study identified some of the subtleties underlying females’ low participation in, and interest in, Science documented in previous research. The tools used for the study are rating scale and questionnaire.

Trumpet (2006) conducted a study on student’s interest in physics at the end of their compulsory schooling in Israel. The factors studied were their options about science classes, their out of school experience in physics and their attitude towards science and technology. The sample of the study was 635 Israeli students 338 females and 297 males randomly sampled in clusters the findings of the study revealed that students overall interest in physics was "neutral"(neither positive nor negative) with boys showing a higher interest than girls. Here we can see a high correlation between students "neutral" interest in physics and the negative opinion about the science classes.

Matter and Schau (2002) conducted a steady on "Gender difference in science attitude achievement relationship". 1238 students of 7th and 8th grade was selected as sample. This sample was selected from 8 different schools in Northern Mexico. Three instruments (one for attitude toward science and the other two for achievement in science)where used for Collection of data. The result shows that there was no significant the effect of achievement in science on attitude among girls with among boys, the result were different.

Banu (1986) studied secondary school students’ attitude towards Science. The total sample he collected was four hundred and fifty‐one students'. Two types of instruments (questionnaire and Attitude Scale) were used to collect the data. The results show that the students in general hold a favorable attitude towards science and male students have more positive attitude towards science than female students, the type of school (science‐school, single‐sex school or general secondary school) attended have an effect on the students' attitudes to science. The low enrollment in science is not due to the lack of interest or negative attitudes to the subject but may be due to some other variables that need to be investigated.

**Conclusion**

From the review of related studies the investigator has found that the attitude towards science is related to demographical variables. A number of studies have been conducted in relation with these variables both in and outside India. As the student brought up in different background the extent of attitude towards science may differ individually. The investigator has also found that the children coming from different locality showcase different attitude towards science. From the review of related studies the investigator found it interesting to study more about the influence of demographical variable on attitude towards science. Hence the modern era the study is found to be relevant.

**Chapter III**

**METHODOLOGY**

* **Variable of the Study**
* **Objectives of the Study**
* **Hypotheses of the Study**
* **Method Used**
* **Sample Selected for the Study**
* **Tool used for Data Collection**
* **Data Collection Procedure**
* **Scoring and Consolidation of Data**
* **Statistical Technique used**

**METHODOLOGY**

Research methodology is a science of studying how will search is done scientifically. It is a systematic way to solve research problem. It is also defined as the study of methods by which high knowledge is gained. Research methodology aims to give the work plan of research. The process of any research work depends largely upon the suitability of the methods, tools and techniques followed by the researcher in collecting and processing data.

Methodology is the process which reveals systematic, theoretical, analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. The methodology of the present study is explained under the following headings.

* Variables of the study
* Objectives of the study
* Hypotheses formulated for the study
* Tools used for the study
* Selection of sample
* Data collection procedure
* Scoring and consolidation of data
* Statistical techniques used for analysis

The detailed description of each of the following is presented below.

**Variables of the Study**

The present study was to analyse influence of demographical variable on attitude towards science. The demographical variable such as gender, locale, type board of education are treated as the independent variable and attitude towards science as the dependent variable.

**Objectives of the Study**

The following are the objectives of the study

1. To find out the extent of attitude towards Science among secondary School students of Kerala.

2. To find out the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To compare the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To study the interaction effect of gender, locale and type of board of education on attitude Towards Science on secondary school students of Kerala.

**Hypotheses of the Study**

The following is the hypotheses formulated for the present study.

1. There is no significant difference in the mean scores of Attitude towards Science between male and female secondary school students

2. There is no significant difference in the mean scores of Attitude towards Science between urban and rural secondary school students

3. There is no significant difference in the mean scores of attitude towards Science between state and CBSE school students.

4. There exists significant interaction effect of the independent variables gender, Locale, type of board of education on the dependent variable attitude towards science of secondary school students of the total sample

**Tools used for Collection of Data**

Collection of relevant data is an important aspect of any research work. The selection of suitable tool is of vital importance for a successful research. A brief description of the tool made use by the investigator to assess the Attitude towards Science.

To measure attitude toward Science a comprehensive scale was constructed and standardized by the investigator with the help of supervising teacher. Prior to developing positive attitude towards Science the investigator reviewed all the available literature. The investigator had fruitful discussion with the experts of education. These discussions with the experts helped the investigator to identify eight components of Attitude towards Science. Each of the components described below.

a) ***Anxiety towards Science***

Science anxiety is the fear of science that is held by many students and adults today. Anxiety is an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure. The causes of science anxiety are many, including past bad experiences in science classes, science anxious teachers in elementary and secondary schools, lack of role models, gender and the stereotyping of scientists in popular media. Eight statements (4, 9, 15, 21, 23, 32, 33, 37) are included under this dimension.

**b) *Motivation towards science***

Motivation is the heart of the learning process. Motivation arouses interest. Interest is considered as the mother of attention and attention is the mother of learning. Motivation energizes and accelerates the behaviour of the learner. So motivation is one of the facts that affect much towards the achievement in science. Four statements ( 5, 7, 24,25) are included under this dimension.

*c)* ***Enjoyment in science***

Positive enjoyment in any subject leads to achievement in science. They enjoyed acquiring new knowledge in science. When teachers are making learning fun students are more willing to participate and take risks. Having fun while learning also helps students to retain information better and become the process is enjoyable and memorable. Nine statements (10, 11, 12, 26, 27, 38, 39, 40, 41) are comes under this dimension.

***d) Attitude of friends and peers towards Science***

As an adolescent then students may begin to spend more time with peers friends and classmates in their own age groups. In addition to this their thinking skill also developed during this period as a result friends values and believes may influence more than their parents values and believes. Friends and peers give a lot of information about science in the class room. Six statements (6, 13, 16, 17, 28, 42) are comes under this dimension.

***e) Attitude of parents******towards Science***

Parents attitude towards science have a significant effect on science achievement parental involvement helps the child to participate in science activities such as science museum visit and library visit etc. but many of the parents believes that teachers are only responsible for their childrens science achievement. But education is a shared responsibility of both parent’s teachers and parents. Six statements (18, 19, 29, 30, 43, and 44) are under this dimension.

**f*) Nature of class room environment***

Based on social learning theory (Bandura, 1977) the social climate of the class room can significantly impact the development of student behaviour, as well as how teachers interact with students. The climate of class room is not only created from student behaviour but teachers also play a significant role for fostering a positive class room climate. Five statements (1, 2, 14, 20, and 31) are under this dimension.

1. ***Achievement in Science***

Achievement is one of the main outcomes of an educational set up. Depending on the level of achievement individuals are characterized as high achievers, average achievers and low achievers. Achievement is the learning attained by students in the subject or a group of subject after a period of instruction. Three statements (3, 45) are included under this dimension.

1. ***Values on science***

Most aspects of life are greatly influenced by science including food, energy; medicine, transportation etc are some of them. Science improves human life at every level from individual to global level. Seven statements (8, 22, 34, 35, 36, 46, and 47) are under this dimension.

Based upon the above mentioned components the investigator developed the Scale on attitude towards science. The draft scale consists 47 items of which 38 are positive and 9 are negative. A copy of the draft tool “Scale on Attitude towards Science “(Malayalam version and English version) are given as Appendices.

Details regarding items under each components of scale on Attitude Towards Science are given in Table 1.

Table 1

*Items under each Components of Scale on Attitude towards Science*

|  |  |
| --- | --- |
| Components | Item Number |
| Anxiety towards Science | 4 ,9, 15, 21 ,23, 32, 33, 37 |
| Motivation towards Science | 5, 7, 24, 25 |
| Enjoyment in Science | 10, 11, 12, 26, 27, 38,39,40, 41 |
| Attitude of friends and peers towards Science | 6, 13, 16, 17, 28, 42 |
| Attitude of parents towards Science | 18, 19, 29, 30, 43, 44 |
| Nature of class environment | 1, 2, 14, 20, 31 |
| Achievement in Science | 3,45 |
| Values on Science | 8, 22, 34, 35, 36, 46, 47 |

1. **Preparation of the scale**

Based upon the above mentioned components the investigator developed the attitude towards Science scale consisted of 47 items. These were eight categories like anxiety towards science, motivation towards science, enjoyment in science, attitude of friends and peers towards science, attitude of parents towards science, nature of class environment, achievement in science and values on science. There are five response columns against each statements representing strongly agree, agree, undecided, disagree and strongly disagree. A copy of the draft of scale given in appendix I, and III.

1. **Try out of the preliminary scale :**

The purpose of the tryout of the scale is to select the items for the final scale by empirically testing the item characteristics. The procedures of the item analysis are described below.

The preliminary scale was administered to a sample of 186 secondary school students selected by stratified sampling techniques giving due representation to gender of the pupils , locality of school, and type of board of education (state or CBSE).

The 186 response sheets obtained were scored and the total score for each sheet was calculated. Then these were arranged in ascending order of the total score and the highest and lowest 27 percentages of the 186 sheets were separated.

The mean and standard deviation of the score obtained for each items for the upper group and lower group were calculated separately. The critical ratio for each items were calculated using the formula.

https://www.chem.utoronto.ca/coursenotes/analsci/stats/images/t2means.gif(Best and Kahn, 2012)

Where

x1  =mean of each item in the upper group

x2 = mean of each item in the lower group

s1 =standard deviation of each item in upper group

s2 =standard deviation of each item in lower group

n1 = sample size of the upper group

n2 = sample size of the upper group

The critical ratio obtained for each item is given below in Table.

Table 2

*Data showing t-value of the items*

| Item number | upper group | | | | Lower group | | | | Critical ratio | status |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x̄1** | σ1 | | | **x̄2** | | σ2 | |
| 1 | 4.56 | 1.14 | | | 3.63 | | 0.71 | | 9.4 | Accepted |
| **2** | 4.56 | 1.26 | | | 3.87 | | 0.76 | | 6.4 | Accepted |
| 3 | 3.14 | 1.62 | | | 2.36 | | 1.43 | | 4.9 | Accepted |
| 4 | 3.20 | 1.55 | | | 2.60 | | 1.48 | | 3.8 | Accepted |
| **5** | 4.36 | 1.29 | | | 3.47 | | 0.98 | | 7.4 | Accepted |
| 6 | 4.46 | 1.23 | | | 4.05 | | 0.90 | | 3.6 | Accepted |
| **7** | 4.48 | 1.29 | | | 3.50 | | 0.88 | | 8.5 | Accepted |
| 8 | 4.22 | 1.37 | | | 3.16 | | 1.12 | | 8.1 | Accepted |
| 9 | 2.09 | 1.23 | | | 1.85 | | 1.22 | | **-1.89** | **Rejected** |
| 10 | 4.74 | 1.16 | | | 4.01 | | 0.59 | | 7.6 | Accepted |
| 11 | 4.36 | 1.45 | | | 3.20 | | 1.00 | | 8.8 | Accepted |
| 12 | 4.71 | 1.46 | | | 3.59 | | 0.62 | | 9.6 | Accepted |
| 13 | 3.95 | 1.27 | | | 3.81 | | 1.27 | | **1.01** | **Rejected** |
| 14 | 3.50 | 1.55 | | | 2.90 | 1.49 | | | 3.77 | Accepted |
| 15 | 2.17 | 1.35 | | | 1.90 | 1.11 | | | 2.09 | Accepted |
| 16 | 4.61 | 1.29 | | | 3.57 | 0.76 | | | 9.47 | Accepted |
| 17 | 4.55 | 1.33 | | | 3.65 | 0.85 | | | 7.75 | Accepted |
| 18 | 4.75 | 1.20 | | | 3.82 | 0.65 | | | 9.27 | Accepted |
| 19 | 4.41 | 1.30 | | | 3.53 | 0.98 | | | 7.28 | Accepted |
| 20 | 3.69 | 1.41 | | | 2.67 | 1.24 | | | 7.35 | Accepted |
| 21 | 3.15 | 1.57 | | | 2.67 | 1.41 | | | 3.07 | Accepted |
| 22 | 4.26 | 1.25 | | | 3.54 | 1.09 | | | 5.90 | Accepted |
| 23 | 2.44 | 1.52 | | | 2.13 | 1.33 | | | 2.06 | Accepted |
| 24 | 4.51 | 1.22 | | | 3.73 | 0.94 | | | 6.90 | Accepted |
| 25 | 4.65 | 1.52 | | | 3.90 | 0.60 | | | 7.87 | Accepted |
| 26 | 4.70 | 1.22 | | | 3.79 | 0.60 | | | 9.17 | Accepted |
| 27 | 4.46 | 3.81 | | | 3.03 | 1.36 | | | 4.79 | Accepted |
| 28 | 4.50 | 1.39 | | | 3.20 | 0.97 | | | 10.40 | Accepted |
| 29 | 4.61 | 1.41 | | | 3.51 | 0.70 | | | 9.50 | Accepted |
| 30 | 3.55 | 1.22 | | | 2.64 | 1.20 | | | 7.28 | Accepted |
| 31 | 2.78 | | | 1.39 | 2.29 | 1.31 | | | 3.47 | Accepted |
| 32 | 2.54 | | | 1.40 | 2.20 | 1.29 | | | 2.41 | Accepted |
| 33 | 2.34 | | | 1.34 | 2.09 | 1.25 | | | **1.87** | **Rejected** |
| 34 | 3.54 | | | 1.33 | 2.78 | 1.33 | | | 5.51 | Accepted |
| 35 | 4.39 | | | 1.17 | 3.12 | 0.89 | | | 11.77 | Accepted |
| 36 | 3.94 | | | 1.32 | 2.98 | 1.22 | | | 7.27 | Accepted |
| 37 | 2.17 | | | 1.36 | 1.91 | 1.35 | | | **-1.78** | **Rejected** |
| 38 | 4.64 | | | 1.21 | 3.80 | 0.90 | | | 7.55 | Accepted |
| 39 | 4.16 | | | 1.22 | 3.07 | 1.00 | | | 9.37 | Accepted |
| 40 | 4.18 | | | 1.41 | 3.00 | 0.95 | | | 9.4 | Accepted |
| 41 | 4.30 | | 1.31 | | 3.60 | 0.97 | | | 5.8 | Accepted |
| 42 | 4.51 | | 1.34 | | 3.31 | 0.91 | | | 10.06 | Accepted |
| 43 | 4.77 | | 1.18 | | 4.00 | 0.59 | | | 7.97 | Accepted |
| 44 | 3.60 | | 1.48 | | 3.04 | 1.43 | | | 3.69 | Accepted |
| 45 | 4.37 | | 1.27 | | 3.43 | 0.91 | | | 8.242 | Accepted |
| 46 | 4.25 | | 1.19 | | 3.39 | | | 0.83 | 8.03 | Accepted |
| 47 | 3.56 | | 1.34 | | 2.48 | | | 1.31 | 7.79 | Accepted |

c) **Finalization of the Scale**

Items with critical ratio greater than 1.96 were selected for the final scale. Thus out of the 47 items 43 items are selected for the final scale. The final scale consists 43 items of which 37 are positive and 6 are negative.

A copy of the final version of the tool is scale on Attitude towards Science (Malayalam and English version) is appended as Appendix II & IV.

1. **Reliability**

Reliability is the degree of consistency that instrument or procedure demonstrates whatever it is measuring, it does so consistently (Best & Kahn, 2014).The investigator ensured the reliability of the tool by using test-retest method. The scale was administrated to sample of 30 secondary school students. After 3 weeks the same scale was administrated to the same sample of 700 secondary school students. The reliability coefficient was 0.742(N=30) which ensured the reliability of the tool Attitude towards Science scale.

1. **Validity of the Tool**

An index of validity shows the degree to which a test measures what it intends to measure when compared with accepted criterion. Validity as the quality of a data gathering instrument or procedure that ensures to measure what is supposed to measure (Best and Khan,2012).

The validity of the present scale was ensured using face validity. A test is said to have face validity when it appears to measure whatever the author had in mind, namely what he thought he was measuring (Garret, 2007).The items in the present scale were phased in the least ambiguous way and the meaning of all the terms were clearly defined, so that the subjects responded to the items without difficulty and misunderstanding . Hence the scale possesses face validity.

1. **Personal data sheet**

The necessary information such as Gender, Locale, and Type of board of education were collected using a personal data sheet.

**Sample used for the Study**

Selection of sample is an important aspect of any research .A sample is a small proportion of population selected for observation(Best and khan,2012) The initial sample for the study constitutes 691 higher secondary school students selected from 20 secondary schools Kozhikode , Malappuram, Wayanad,Kannur and kollam districts of Kerala . The samples were selected using stratified sampling techniques by giving due representation to the factors like gender of the pupils, locale of the school and type of board of education

1. **Gender**

Gender has great influence on findings of research .Since it has been found that sex difference exists in many of the psychological variables.

1. **Locale of the school**

Locality of a school is an important aspect in any research program and it has great influence on the result of a research.

1. **Type of board of education( state& CBSE)**

The existing schools in Kerala fall mainly into board categories as State, CBSE.

Details of the Schools selected for the data collection is given in table 3.

Table 3

*Details of sample selected*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl. No. | Name of school | district | locale | Type of management |
| 1 | Govt.model school | kozhikkode | urban | state |
| 2 | Silver hills public school | kozhikkode | urban | CBSE |
| 3 | Narikkuni english medium school | kozhikkode | rural | CBSE |
| 4 | Narikkuni govt.high school | kozhikkode | rural | state |
| 5 | Govt. Town higher secondary school | kannur | urban | state |
| 6 | Sree narayana vidya mandir kannur | kannur | urban | CBSE |
| 7 | parassinikkadavu high school | kannur | rural | state |
| 8 | St. Marys english medium school kannur | kannur | rural | CBSE |
| 9 | Govt. Voccational higher secondary school kalpetta | vayanad | urban | state |
| 10 | MCF public school | vayanad | urban | CBSE |
| 11 | Govt. Higher secondary school kaniyampetta | vayanad | rural | state |
| 12 | Mount tabor english school meppadi | vayanad | rural | CBSE |
| 13 | GGHSS Malappuram | malappuram | urban | state |
| 14 | Venerini public school | malappuram | urbam | CBSE |
| 15 | Vettilappara high school | malappuram | rural | state |
| 16 | Holly cross convent school | malappuram | rural | CBSE |
| 17 | Govt.hss chavara kollam | kollam | urban | state |
| 18 | TKM centenary public school karikode | kollam | urban | CBSE |
| 19 | Nadukkunna high school pathanapuram | kollam | rural | state |
| 20 | Al.Aman public school pathanapuram | kollam | rural | CBSE |

**Data Collection Procedure**

For the collection of data, the investigator personally contacted the head of the institutions for obtaining permission. The investigator met the students and explained the purpose and ensured their co-operation to make the study as successful as possible. After that copies of the tools were distributed and collected back.

Population under study is secondary school students of Kerala. A sample of 691 Students will be collected from five districts of Kerala such as Kozhikode, Kannur, Malappuram, Wayanad and Kollam.

Stratified sampling method will be used for collecting the data. The strata being gender, locale, type of Board of education to which school is affiliated (state and (CBSE). Breakup of the sample in various districts are given in table.4

Table 4

*Breakup of the sample in various districts.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Districts | Urban | | Rural | |
| Male | Female | Male | Female |
| Kozhikkode | 40 | 29 | 43 | 47 |
| Kollam | 34 | 28 | 33 | 35 |
| Kannur | 38 | 32 | 23 | 32 |
| Vayanad | 35 | 30 | 37 | 33 |
| Malappuram | 34 | 35 | 36 | 37 |

**Statistical Techniques Used**

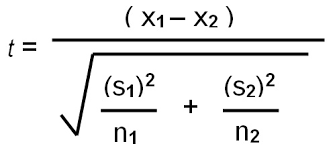
Following statistical techniques were used to analyze the data.

**Descriptive Statistics**

Descriptive statistics like arithmetic mean, median, mode were calculated for finding the extent of Attitude towards Science.

**Test of Significance of difference between means**

The mean scores obtained are compared using the test of significance of difference between means for large independent sample. The formula used for finding the critical ratio is,

(Best and Khan, 2012)

Where,

X1 = Mean of each item in the upper group

X2 = Mean of each item in the lower group

s1 = standard deviation of each item in the upper group

s2 = standard deviation of each item in the lower group

n1 = Sample size of upper group

n2 = Sample size of lower group

If obtained critical ratio is greater ratio is greater than the tabled valued required for significance at 0.01 level; the mean difference is considered to be significance.

**Three way ANOVA**

The three way ANOVA is used to determine if there is an interaction effect between three independent variable on a continuous variable.

Analysis of variance (ANOVA) has been defined as “the separation of Variance ascribable to other groups”. Fisher (I950). According to Ferguson, (1976),” the analysis of variance is a method of dividing the variation obtained in the experimental data in to different parts s, each Part assignable to a known source, cause or factor. In its simplest form the ANOVA is used to test significance of the difference between the means of a number of different populations. This is an effective way to determine whether the means of more than two samples are too different to attribute to sampling error. ANOVA can include one or more independent variable. If three independent variables are included simultaneously in an ANOVA; the analysis is called three ways ANOVA. In ANOVA, the F ratio is computed by

F=

The within groups variance represents the sampling error in the distributions. The between groups variance represents the influence of the variable of interest or the experimental variable.

In this study ANOVA is used to find out whether Gender, Locale and Type of board of education have any interaction effect on attitude towards science of secondary school students of Kerala. (2x2x2 Factorial design).

**Chapter IV**

**ANALYSIS AND INTERPRETATION**

* **Objectives of the study**
* **Hypotheses of the study**
* **Preliminary Analysis**
* **Major Analysis**

**ANALYSIS AND INTERPRETATION**

**Introduction**

Analysis of data is the heat of research report. A plan of analysis should be prepared in advanced before the actual collection of material. Analysis is a process which enters into research in one form or another in the very beginning. It may be fair to say that research consist of general of two larger steps gathering of data, the analysis of these data. Analysis of data, studying the organized materials in order to determine inherent facts or meaning ,requires an alert, flexible and open mind. No similarities difference, trends and outstanding factors should go unnoticed, larger division of material should broken down into smaller units and rearranged in new combination to discover new factors and relationship. Data should be studied from many angles as possible to hand out new and never facts.

The analysis is done in accordance with the major hypotheses of the study

**Objectives of the Study**

The following are the objectives of the study

1. To find out the extent of attitude towards Science among secondary School students of Kerala.

2. To find out the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To compare the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To study the interaction effect of gender, locale and type of board of education on attitude Towards Science on secondary school students of Kerala.

**Hypotheses of the Study**

The following is the hypotheses formulated for the present study.

1. There is no significant difference in the mean scores of Attitude towards Science between male and female secondary school students

2. There is no significant difference in the mean scores of Attitude towards Science between urban and rural secondary school students

3. There is no significant difference in the mean scores of attitude towards Science between state and CBSE school students.

4. There exists significant interaction effect of the independent variables gender, Locale, type of board of education on the dependent variable attitude towards science of secondary school students of the total sample.

**Preliminary Analysis**

The important statistical properties of the scores on the variables under study were analyzed as a preliminary step. The Mean, Median, Mode, Standard deviation, Skewness and Kurtosis were computed for the whole sample. The details of the Statistics are presented in the following table.

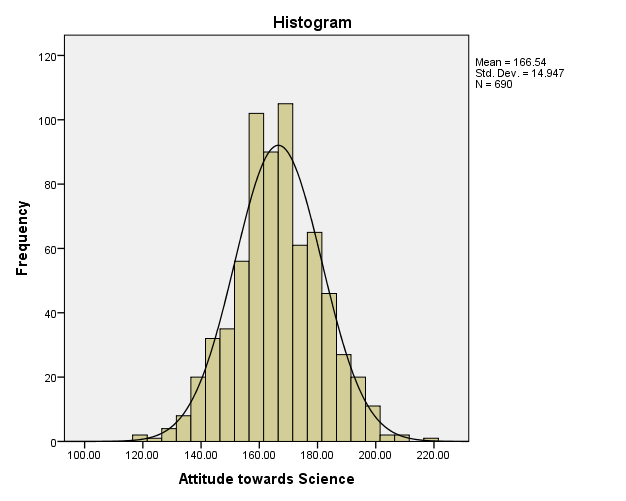
Table 5

*Descriptive statistics of the variable attitude towards science for the total sample is given in the table*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | Total Sample | Mean | Median | Mode | Standard Deviation | Skewness | Kurtosis |
| Attitude towards science | 691 | 166.5377 | 166.0000 | 160.00 | 14.94700 | -.025 | .158 |

Table 5 reveals that in the case of attitude towards science, the two measures of central tendency viz., Mean and Median for the variables are almost equal and Mode is slightly deviated from the Mean. The extent of Skewness obtained is -.025 which shows the distribution is negatively skewed. The measure of Kurtosis is 0.158 which is platykurtic. Skewness obtained is nearer to zero indicating that the distribution has the possibility to be normal. Thus it can be concluded that the distribution of attitude towards science is not considerably deviating from the normality.

Thus the Mean scores of Attitude towards science on Secondary school Students are not deviating from the normality. The graphical representation of the measures of the variable Attitude towards scienceon Secondary School Students for the total sample is presented in the following figures.



*Figure – 1: Smoothed frequency curve showing, attitude towards science on Secondary School Students for the Total Sample.*

**Extent of attitude towards science among secondary school students.**

The extent of the Variable attitude towards science of Secondary school students in the total sample was established by calculating the mean score and percentile.

The mean score of attitude towards science of secondary school students of the total sample is presented in the table.

Table 6

*Mean score of attitude towards science of secondary school students*

|  |  |
| --- | --- |
| Variable Mean score | Mean score |
| Attitude towards Science | 166.5377 |

The above table reveals that the mean score of attitude towards science of secondary school students for the total sample is 166.5377 which is greater than neutral value (129) which means that Secondary school Students of Kerala have high positive attitude towards science

**Percentile norm for the total sample**

Percentile norm for the total sample are presented in the table

Table 7

*Percentile Norms of the Total Sample*

|  |  |
| --- | --- |
| Percentile | Score |
| P10 | 147 |
| P20 | 155 |
| P30 | 160 |
| P40 | 163 |
| P50 | 166 |
| P60 | 170 |
| P70 | 174 |
| P80 | 179 |
| P90 | 186 |

The table 6 shows the percentile scores for the total sample. The 10th percentile scores of attitude towards science of secondary school students is 147.That means only 10 percent of the secondary school students lies below the score of 147 and 90 percent of the students lies above the score of 147. 20th percentile scores of attitude towards science of secondary school students is 155.That means only 20 percent of the secondary school students lies below 130 and 80 Percent of students lies above the score of 155. 30th percentile scores of secondary school students attitude towards science is 160. That means only 30 percent of the secondary school students lies below 160 and 70 percent of students lies above the score of 160.

40th percentile scores of attitude towards science of secondary school students is 163. That means only 40 percent of the students of attitude towards science lies below 163 and 60 percent of students lies above the score of 163. 50th percentile scores of attitude towards science of secondary school students is 166. That means only 50 percent of the secondary school students lies below the score of 166 and 50 percent of students lies above the score of 166.60th percentile scores of attitude towards science of secondary school students is 170. That means only 60 percent of the secondary school students lies below the score of 170.

70th percentile scores of attitude towards science of secondary school students is 174. That means only 70 percent of the secondary school students lies below the score of 174. 80th percentile scores of attitude towards science of secondary school students is 179. That means only 80 percent of the secondary school students lies below the score of 179. 90th percentile scores of attitude towards science of secondary school students is 186. That means only 90 percent of the secondary school students lies below the score of 186.

**Study of group Differences**

In the section of analysis the investigator measures the mean score difference based on the sub sample gender. The main intention was to find out whether there exist any significant differences in the score of attitude towards science based on male and female students. For this purpose mean and standard deviation were calculated separately and were subject to test of significance of difference of mean.

**Comparison of the mean score of attitude toward science between male and female students**

The mean and standard deviation of the variable attitude towards science of male and female students for the total sample were subjected to test of significance of difference of mean. The basic data for the test of significance and the obtained value for male and female students of Secondary School are presented in the table.

Table 8

*Data and results of the’t’ test of attitude towards science of secondary school students between male and female*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Category | Number | Mean | S.D. | ‘t’ value |
| Attitude towards science | Male | 352 | 164.94 | 14.77 | 2.88 |
| Female | 338 | 168.20 | 14.96 |

Table 8 reveals that the mean score of attitude towards science for male was 164.94 and for female were 168.20. The standard deviation 14.77 for male and 14.96 for female.

From the above table it revealed that the ‘t’ value obtained for the attitude towards Science with respect to gender is 2.88 which is greater than the Table value of 't’ 1.96(0.5 level)

**Summary of Analysis**

Based on the analysis, the investigator reached at the following conclusion. There is a significant difference in the mean scores of attitude towards science based on the sub sample gender

Table 9

*Data and results of the ‘t’ test of attitude towards science of secondary school students between Urban and Rural*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Category | Number | Mean | S.D. | ‘t’ value |
| Attitude towards science | Urban | 325 | 165.64 | 15.14 | 0.84 |
| Rural | 365 | 167.32 | 14.74 |

Table 9 shows that the mean score of attitude towards science for urban was 165.64 and for rural were 167.32. The standard deviation 15.14 for urban and 14.74 for rural.

From the above table it revealed that the‘ t’ value obtained for the attitude towards Science with respect to gender is 0.84 which is lesser than the Tabled value of 't’ 1.96 (0.5level)

**Summary of Analysis**

Based on the analysis, the investigator reached at the following conclusion. There is no significant difference in the mean scores of attitude towards science based on the sub sample locale.

Table 10

*Data and results of the ‘t’ test of attitude towards science of secondary school students between State and CBSE*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Category | Number | Mean | S.D. | ‘t’ value |
| Attitude towards science | State | 330 | 165.60 | 15.07 | 0.8299 |
| CBSE | 360 | 167.39 | 14.79 |

Table 10 shows that the mean score of attitude towards science for state was 165.60 and for CBSE were 167.39. The standard deviation 15.07 for male and 14.79 for female.

From the above table it revealed that The 't’ value obtained for the attitude towards Science with respect to type of board of education is 0.84 which is lesser than the Table value of 't’ 1.96 (0.5level).

**Summary of Analysis**

Based on the analysis, the investigator reached at the following conclusion. There is no significant difference in the mean scores of attitude towards science based on the sub sample type of board of education.

**Discussion**

Based on the analysis the investigator reached the following conclusion. There is a significant difference in the mean scores of attitude towards science based on the subsample gender, there is no significant difference in the mean scores of attitude towards science based on the subsample locale and there is no significant difference in the mean scores of attitude towards science based on type of board of education.

**Three way ANOVA (2X2X2) Factorial Design**

The three way ANOVA is used to determine if there is an interaction effect between three independent variable. Three way ANOVA are useful for gaining an understanding of complex interactions were more than one variable may influence the result.

Here the investigator used three way ANOVA because here are three variable namely gender, locale and type of board of education and the investigator found only interaction effect and main effect was eliminated because it was done already by doing the group differences. The subsample with gender have two levels, boys and girls, locale with two levels urban and rural and type of board of education with two levels CBSE and state.

The analysis and discussion of result with regard to 3 way ANOVA technique are described in the following sections.

**Interaction effect of gender, locale, and type of board of education on attitude towards science (2x2x2) Factorial design**

To find out whether the variable gender, locale, board of education have any interaction effect on attitude towards science of secondary school students of Kerala. Three way ANOVA with 2x2x2 factorial design was done for 691 students. The details regarding ANOVA are shown below.

Table 11

*Three way ANOVA (2X2X2) design*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source of variation | Sum of squares | Df | Mean Square | F |
| Gender\*Locale | 1.909 | 1 | 1.909 | .009 |
| Gender\*Board of education | 697.213 | 1 | 697.213 | 3.207 |
| Locale\* Board of education | 1080.311 | 1 | 1080.311 | 4.969 |
| Gender\*Locale\*Board of education | 983.662 | 1 | 983.662 | 4.524 |
| Total | 2763.095 | 2763.09 |  |  |

Interaction effect of Gender and Locale on Attitude towards Science

Table 12

Interaction effect of gender and locale on Attitude towards Science

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sources of variation | Sum of Squares | df | Mean Square | F |  |
| Gender  Locale  Gender\* Locale | 1783.750  415.375  18.518 | 1  1  1 | 1783.750  415.375  18.518 | 8.068  1.879  .084 |  |
| Error | 151659.606 | 686 | 221.078 |  |  |
| Total | 19290943 | 686 |  |  |  |

When the two way interaction of gender and locale on attitude towards science is considered the F value obtained is 0.084. This value is less than 3.85, the tabled value of F for (1, 682) the degrees of freedom at 0.05 level of significance. This indicates that the variables gender and locale have no significant interaction effect on attitude towards science

**Interaction effect of Gender and Board of Education on Attitude Towards Science**

Table 13

*Interaction effect of gender and board of education on Attitude towards Science*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sources of variation | Sum of Squares | df | Mean Square | F |  |
| Gender  Board of education  Gender\* Board of education | 1959.942  551.823  740.977 | 1  1  1 | 1959.942  551.823  740.977 | 8.197  2.511  3.371 |  |
| Error | 150780.344 | 686 | 219.796 |  |  |
| Total | 19290943 | 690 |  |  |  |

When the two way interaction of gender and board of education on attitude towards science is considered the F value obtained is 3.371 This value is less than 3.85, the tabled value of F for (1, 682) the degrees of freedom at 0.05 level of significance. This indicates that the variables gender and board of education have no significant interaction effect on attitude towards science

**Interaction effect of Locale and Board of Education on Attitude towards Science**

Table 14

*Interaction effect of locale and board of education on Attitude towards Science*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sources of variation | Sum of Squares | df | Mean Square | F |  |
| Locale  Board of education  Locale\* Board of education | 394.375  432.532  1047.649 | 1  1  1 | 394.376  432.532  1047.881 | 1.781  1.954  4.733 |  |
| Error | 151887.649 | 686 | 221.411 |  |  |
| Total | 19290943. | 690 |  |  |  |

When the two way interaction of locale and board of education on attitude towards science is considered the F value obtained is 4.733. This value is greater than 3.85, the tabled value of F for (1, 682) the degrees of freedom at 0.05 level of significance. This indicates that the variables gender and locale have a significant interaction effect on attitude towards science.

**Interaction effect of Gender, Locale and Board of Education on Attitude Towards Science**

From the table 11, when the two way interaction of gender, locale and board of education on attitude towards science is considered the F value obtained is 4.524. This value is greater than 2.63, the tabled value of F for (1, 682) the degrees of freedom at 0.05 level of significance. Since the calculated F value is greater than the tabled value, the interaction effect of Gender, Locale and Board of education on attitude towards science of secondary school students of Kerala.

**Discussion**

From the analysis it can be concluded that the attitude towards science of secondary school students of Kerala does not vary ‘Gender and Locale’ and ‘Gender and ‘Board of education’. But attitude towards science of secondary school students of Kerala vary significantly between ‘Locale’ and ‘Board of education’. And it can also be concluded that the attitude towards science of secondary school students vary significantly between relevant subsamples based on Gender, Locale and Board of education.

**Chapter V**

**SUMMARY, FINDINGS, CONCLUSION AND SUGGESTIONS**

* **Study in Retrospect**
* **Major Findings**
* **Conclusion**
* **Tenability of Hypotheses**
* **Educational implications for the Study**
* **Suggestions for further Research**

**SUMMARY, FINDINGS, CONCLUSION AND**

**SUGGESTIONS**

This chapter provides an overview of the significant aspects of the various stages of the study. This includes study in retrospect, major findings emerged from the study, conclusion arrived, educational implications of the findings and suggestions for further research.

**Study in retrospect**

There has been increased proliferation of knowledge in the scientific and technological fields that demands a talented and creative scientific community capable of developing advancement in science and technology so as to be able to compete with other nations. Science education therefore has to be constantly updated and restructured even at the school level to better impart scientific skills and inculcate a positive attitude towards science among students so that they may be able to keep up with the continuing changes in science and technology.

Science is a quest to know the truth by direct perception rather than through a belief system. It is not a magic but is the process of observing, describing, exploring and using the physical world. With the highly developed mind, man can observe precisely, correlate the results of the observation meaningfully and predict future happenings logically. This is the basic of Scientific approach and so science can be considered as compounded of curiosity, observation and thought.

According to Jawaharlal Nehru science made the world jump forward with a leap, built up a glittering civilization, opened up innumerable avenues for the growth of knowledge and added to the power of man to such an extent that for the first time, it was possible to conceive that man could triumph over and shape his physical environment.

Science plays a vital and pivotal role in the development of many qualities of head and heart in the individual, thereby helping him to be a good citizen in the society. Science helps him to be useful, productive and progressive member of the society. Science can also develop qualities like truthfulness, honesty, open mindedness and goodness. The study of science proposes explanations for “what is” in the natural world, where as the study of technology provides solutions to human problems of adaptation. They go together a hand in glove and will have a mounting impact on our social and personal environment.

Science education cultivates student’s curiosity about the world and enhances scientific thinking. Through the inquiry process, students will recognise the nature of science and develop scientific knowledge and science process skill to help them evaluate the impact of scientific and technological developments.

The science is important from practical point of view. A person may belong to high or low class of the society but he utilizes the knowledge of science in one or another form. By developing a positive attitude towards science, students can meet the challenges of technological developments. By developing a positive attitude, the students can distinguish between right and wrong as these get developed through science and by developing a favourable attitude the qualities like truthfulness, honesty, purity of thought, cleanliness, justice and self control gets developed in the students. Science is helpful in developing all our intellectual powers like power of imagination, memorization, observation, invention, concentration, creativity, logical thinking systematized reasoning and skills.

The secondary school students are the immediate group who have to decide on the future stream of study, whether science related or not. This lead the investigator to take secondary school students are the sample of the study.

The present study aims to analyse the influence of demographical variables like gender, locale, board of education, and family income on attitude towards science.

**Restatement of the problem**

The present study entitled as certain demographic variable influencing attitude towards science of secondary school students of Kerala.

**Variables of the study**

The present study was to analyse influence of demographical variable on attitude towards science. The demographical variable such as gender, locale, type board of education are treated as the independent variable and attitude towards science as the dependent variable.

**Objectives of the Study**

The following are the objectives of the study

1. To find out the extent of attitude towards Science among secondary School students of Kerala.

2. To find out the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To compare the extent of attitude towards Science among sub groups based on

* Gender
* Locale
* Type of Board of education.

3. To study the interaction effect of gender, locale and type of board of education on attitude Towards Science on secondary school students of Kerala.

**Hypotheses of the Study**

The following is the hypotheses formulated for the present study.

1. There is no significant difference in the mean scores of Attitude towards Science between male and female secondary school students

2. There is no significant difference in the mean scores of Attitude towards Science between urban and rural secondary school students

3. There is no significant difference in the mean scores of attitude towards Science between state and CBSE school students.

4. There exists significant interaction effect of the independent variables gender, Locale, type of board of education on the dependent variable attitude towards science of secondary school students of the total sample

**Methodology**

The procedure adopted for the research study is described below.

**Sample**

Population under study is secondary school students of Kerala. A sample of 691 students belonging to five districts of Kerala such as Kozhikode, Kannur, Malappuram, Wayanad and Kollam. Stratified random sampling method was used for collecting the data.

**Tools Used**

General data sheet will be used for collecting information about the demographical variables.

A scale of Attitude Towards Science scale will be was developed Ms (Anjusha & Dr. Aseel Abdul Wahid, 2018) by the investigator to measure Attitude towards Science of secondary school students.

**Statistical Techniques Used**

The following statistical techniques were used for analysing the data.

1. Descriptive statistics

2. Test of significance of difference between means

3. Three way ANOVA

**Major Findings**

The major findings evolved from the study are presented below.

1. The descriptive statistics for measuring the attitudes towards science the values of mean, median and mode for attitude towards science for the total sample of the secondary school students are 166.53, 166, 160 which is approximately equal. The coefficient of skewness is -0.25 suggesting that the distribution is slightly negatively skewed. The measure of kurtosis is .158 that is, the curve is Leptokurtic. For the subsamples mean, median and mode are approximately equal. Therefore it is concluded that the distribution of the variable attitude towards science for the total sample is approximately normal.
2. There is a significant difference in Attitude towards science of male and female students of secondary schools students of Kerala. The t value obtained for Attitude towards science is 2.880 for the subsample based on gender which is greater than the table value (1.96) at 0.05 level. Since the obtained value of t is greater than tabled value.
3. There is no significant difference in attitude towards science of urban and rural secondary school students. The t value obtained for Attitude towards science is 1.475 for the subsample based on locale of schools which is less than table value at 0.05 levels (1.96) were the obtained t value is less than tabled value.
4. There is no significant difference in the mean scores of attitude towards science of State and CBSE secondary school students. The t value obtained Attitude towards science is 1.56 for sub sample based on type of board of education which is less than table value (1.96) at 0.05 level. It can be concluded that there is no significant difference in the mean scores of Attitude Towards Science of State and CBSE Secondary School students.
5. The interaction effect of Gender and Locale on Attitude Towards Science of secondary school students of Kerala was not significant. (F=.009, P>0.05, for (1, 682) degrees of freedom). Which means that there is no interaction affect on gender and locale on Attitude towards Science.

6) The interaction effect of Gender and Type of Board of Education on Attitude Towards Science of Secondary school students of Kerala was not significant. (F=3.207, P>0.05, for (1, 682) degrees of freedom). Which means that there is no interaction affect on gender and type of board of education on Attitude towards Science.

7) The interaction effect of Locale and Type of Board of Education on Attitude Towards Science of secondary school students of Kerala was significant. (F=4.969, P>0.05, for (1, 682) degrees of freedom). Which means that there is no interaction affect on locale and type of board of education on Attitude towards Science.

1. The interaction effect of Gender Locale and Type of Board of Education on Attitude Towards Science of secondary school students of Kerala was significant. (F=4.524, P>0.05, for (1, 682) degrees of freedom). Which means that there is no interaction affect on gender, locale and type of board of education on Attitude towards Science.

**Tenability of Hypotheses**

1. The first hypothesis states that There is no significant difference in the mean scores of Attitude towards Science between male and female secondary school students

The result shows that there exists a significant difference between boys and girls in the attitude towards science of secondary school students of Kerala. So the first hypothesis is rejected.

1. The second hypothesis shows that There is no significant difference in the mean scores of Attitude towards Science between urban and rural secondary school students

The result shows that there is no significant difference between urban and rural in the attitude towards science of secondary school students of Kerala. So the second hypothesis accepted.

1. The third hypothesis states that *there is no significant difference in the mean scores of Attitude towards Science between state and CBSE school students.*

The result shows that there is no significant difference between urban and rural in the attitude towards science of secondary school students of Kerala. So the second hypothesis accepted.

1. The fourth hypothesis shows that there exists a significant interaction effect in gender, locale and type of Board of Education on attitude towards science of secondary school students of Kerala.

Gender and locale, gender and type of board of education have no significant interaction effect on attitude towards science of secondary school students of Kerala. But locale and board of education, gender, locale, type of board of education has a significant interaction effect on attitude towards science. Hence hypothesis four is partially substantiated.

**Conclusion**

The study was conducted with the objective of finding extend of attitude towards science of secondary school students of Kerala. This was studied using statistical technique like descriptive statistics and test of significant difference.

Based on the analysis the investigator reached the following conclusions. There is a significant difference between boys and girls in the mean scores of attitude towards science of secondary school students of Kerala, There is no significant difference between urban and rural in the mean scores of attitude towards science of secondary school students of Kerala and There is no significant difference between state and CBSE students in the mean scores of attitude towards science of secondary school students of Kerala.

It can be concluded that there is no significant difference in attitude towards science of urban and rural secondary school students. There is no significant difference in attitude towards science of urban and rural secondary school students. It can be concluded that there is no significant difference in the mean scores of attitude towards science of state and CBSE secondary school students. ‘Gender’ and ‘Locale’ and ‘Gender’ and ‘Type of Board of Education have no interaction effect on Attitude Towards Science. But ‘Locale’ and ‘Type of Board of education’ and ‘Gender’,‘Locale’, ‘Type of Board of Education have significant interaction effect on Attitude towards Science on secondary school students of Kerala

**Educational Implications**

The value of any of research in education lies in the implications of the study. Based on the major findings of the present study, some practical suggestions have been given by the investigator to improve the present educational practices.

1. The first finding shows that there is a significant difference in Attitude towards science of male and female students of secondary schools students of Kerala. That is the secondary school students of Kerala have a significant difference in attitude towards science based on their gender. This shows that male students have more attitude towards science than female students because they differ in their perception of doing in science, and also differ in their intellect. The investigator found that skill such as objectivity, specific thinking, experimentation are more in males than females and the exploratory mind is also in boys. The boys activity always engaged in club activity and beyond classroom activitites.
2. There is no significant difference in attitude towards science of urban and rural secondary school students. This shows that the locality of the student belonging is not a factor of determining the attitude towards science of secondary school students of Kerala. The investigator found that because getting the motivation towards science of urban students in home as well as school is similar to rural students. So the investigator then found a conclusion that students locality is not influencing the attitude towards science of secondary school students of Kerala.
3. There is no significant difference in the mean scores of attitude towards science of state and CBSE secondary school students. This means that the board of education in which the student studying is also not a factor of determining the attitude towards science of Kerala. Here the investigator found that the nature of class room environment in state school is similar to CBSE schools. All the facilities are equally available in state and CBSE students like smart class rooms and they spend more time for their science study. The Medias, science channels etc. play a vital role here.
4. The interaction effect of Gender and Locale on Attitude towards Science of secondary school students of Kerala was not significant. This means that any gender in which he is studying in any locale that is rural or urban have no interaction effect. Either male or female studying in rural or urban locality is not determining the attitude towards science of secondary school students. The investigator found that nowadays both boys and girls are getting equal weitage in home and school, and also the urban and rural students.
5. The interaction effect of Gender and Type of Board of Education on Attitude Towards Science of Secondary school students of Kerala was not significant. That is some boys or girls have no interaction effect with which board of education he or she is studying. Here also the investigator found that the achievement in science of both boys and girls in state and CBSE are same.

6) The interaction effect of Locale and Type of Board of Education on Attitude towards Science of secondary school students of Kerala was significant. The locale that is urban or rural with type of board of education state or CBSE have an interaction effect. Here the investigator found that the locality with type of board of education have an interaction effect. That is the investigator reach a conclusion that the child studying in urban CBSE school, rural CBSE school, rural state school, urban state school have making different attitude towards science. the investigator believes that the urban CBSE school students and rural CBSE have more attitude towards science than others.

1. The interaction effect of Gender Locale and Type of Board of Education on Attitude towards Science of secondary school students of Kerala is significant. This means that the two gender either boys or girls have an interaction effect on locale with two levels urban or rural and type of board of education with two levels state or CBSE. The investigator believes that the urban CBSE students have more attitude towards science than rural CBSE students. This is because the parents shows interest in opting their students in CBSE for their study. They get enough motivation towards science both from home and school and get chance to participate in science fairs, exhibitions, and quiz’s. Their anxiety towards science was low.

**Suggestions for Further Research**

The findings of the study and limitations encountered in the present study helped the investigator to suggest the following for further research. The study can be conducted at various levels such as secondary, graduate and post graduate level etc.

* The present study can be extended to other states.
* Role of teachers in promoting science creativity can be studied.
* The same study can be extended to central schools, OXFORD, I.C.S.E students
* The study can be repeated in differently abled students.
* The study can be extended to different samples like tribes, states etc
* The study can be conducted to different educational levels such as higher secondary, higher education levels.

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**APPENDICES**

**APPENDIX I**

**DRAFT (Malayalam version)**

**ATTITUDE TOWARDS SCIENCE SCALE(2018)**

**FAROOK TRAINING COLLEGE**

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**\nÀt±-i-§Ä**

imkv{X-hn-j-b-§-fmb ^nkn-Ivkv, sIan-kv{Sn, \_tbm-f-Pn XpS-§nb hnj-b-§-fn-epÅ \n§-fpsS at\m-`mhw Adn-bm-\pÅ Nne {]kvXm-h-\-IÄ BWv Xmsg sImSp-¯n-cn-¡p-¶-Xv. Xmsg X¶n-cn-¡p¶ Hmtcm {]kvX-hm-\bv¡pw ]qÀ®-ambn tbmPn-¡p-¶p, A`n-{]m-b-an-Ã, hntbm-Pn-¡p-¶p, ]qÀ®-ambn hntbm-Pn-¡p¶p F¶n-§s\ A©p {]Xn-I-c-W-§-fp-­v. Ah D¯-c-¡-S-em-knÂ Hmtcm {]kvXm-]-\-bp-sSbpw {Ia \¼-dn\v t\sc tcJ-s¸-Sp-¯n-bn-cn-¡p-¶p. \n§-fpsS {]Xn-I-cWw A\p-tbm-Py-amb D¯-c-¯n\v Xmsg icn NnÓw (✓) D]-tbm-Kn¨v AS-bm-f-s¸-Sp-¯p-I. Hcp {]kvXm-h-\bv¡v Hcp D¯cw am{Xta tcJ-s¸-Sp-¯m-hq.

1. imkv{Xm-²ym-]nI ¢mkv FSp-¡p¶ ka-b¯v F\n¡v a\-Ên-em-hm¯ Imcy-§Ä Rm³ kwibw tNmZn-¡m-dp-­v.

2. ]T\ {]hÀ¯-\-§Ä kwL{]hÀ¯-\-§-fmbn A²ym-]nI \ÂIp-¶-Xn-eqsS Fsâ imkv{X-]-T\w sa¨-s¸-Sp-¯m³ AXv klm-bn-¡m-dp-­v.

3. imkv{Xm-²ym-]nI ¢mkv FSp-¡p¶ ka-b¯v CSbv¡v tNmZyw tNmZn-¡p-t¼mÄ Rm³ tNmZn-¡p¶ tNmZy-§Ä sXäptam, AsÃ¦nÂ aäp-Å-hÀ Ifn-bm-¡ptam F¶ Imc-W-¯mÂ Rm³ kwi-b-§Ä tNmZn-¡m³ aSn-¡m-dp-­v.

4. imkv{Xm-²ym-]nI ¢mkv FSp-¡p¶ ka-b¯v Cu ]mT-`m-K-§-fnÂ FÃmw ImWm-]mTw ]Tn-t¡-­n-h-cptamsb¶v Rm³ Nn´n-¡m-dp­v

5. F.-]n.-sP. A\_vZpÄ Iemw, kn.-hn. cma³ XpS-§nb {]Xn-`m-im-en-I-fmb imkv{X-Ú-·m-cpsS imkv{X kw`m-h-\-Isf¡pdn¨v a\-Ên-em-¡p-t¼mÄ Ahsc t]mse X\n¡pw BI-W-sa¶v Rm³ B{K-ln-¡m-dp-­v.

7. imkv{Xm-²ym-]nI ¢mknÂ F´v, F§-s\, F´p-sIm­v F¶n-§-s\-bpÅ tNmZy-§Ä tNmZn-¨p-sIm­v imkv{X-¯n-epÅ ]e Bi-b-§fpw Is­-¯p-¶-Xn-\mbn t{]mÕm-l\w \ÂIm-dp-­v.

8. tcmK-§-sf-¡p-dn¨pw AXn-s\-Xn-cmb NnIn-Õ-I-sf-¡p-dn¨pw Hcp hyà-amb [mcW \ap¡v imkv{X-]-T-\-¯n-eqsS am{Xta e`n-¡p-I-bp-Åq.

9. imkv{Xm-²ym-]nI em\_v {]hÀ¯-\-§Ä sN¿p-t¼mÄ Dt±-in¨ ^ew e`n-¡ptam F¶ Nn´ Fs¶ BImw-£m-`-c-Xn-\m-¡m-dp­v

10. kvamÀ«v ¢mkv D]-tbm-Kn-¨pÅ imkv{Xm-²ym-]n-I-bpsS hnj-bm-h-X-cWw kb³kv hnj-b-t¯m-SpÅ Fsâ Xmev]cyw hÀ²n-¡m³ Imc-W-am-Im-dp­v

11. bqSyq-\_nse imkv{X-hp-ambn \_Ô-s¸« hoUn-tbm-IÄ ImWm³ Rm³ {ian-¡m-dp-­v.

12. imkv{X {]m[m-\y-apÅ Øe-§-fn-te¡v ^oÂUv {Sn¸v t]mIp-¶Xv F\n¡v B\µw ]I-cp-¶-Xm-Wv.

13. Fsâ Iq«p-ImÀ¡v e`n¨ kb³kv hnj-b-§-fnse amÀ¡v Fsâ amÀ¡p-ambn Rm³ Xmc-Xayw sN¿m-dp-­v.

14. Bh-iy-apÅ kµÀ`-§-fnÂ X§-fpsS ¢mkp-IÄ Xpd-Êmb Øe-t¯m, sse{\_-dn-bntem et\_m-d-«-dn-bntem sh¨v \S-¯m³ A[ym-]nI {ian-¡m-dp-­v.

15. A²ym-]nI D¯-c-t]-¸À ¢mÊnÂ hnX-cWw sN¿p-t¼mÄ ap¼v In«nb amÀ¡nt\-¡mÄ Ipd-bptam F¶v Rm³ hymIp-e-s¸-Sm-dp-­v.

16. Fsâ kplr-¯p-¡Ä Bsc-¦nepw imkv{X-]-T-\-¯nÂ {]bm-k-a-\p-`-hn-¡p-t¼mÄ Rm\-hsc Fs¶s¡m­v Ign-bpw-hn[w klm-bn-¡m-dp-­v.

17. Fsâ kplr-¯p-¡-fnÂ Bsc-¦nepw imkv{X-hp-ambn \_Ô-s¸« t\«w D­m-bn-«p-s­-¦nÂ Rm³ AXnÂ A`n-am\w sImÅm-dp-­v.

18. imkv{X-]-T-\-¯n\v th­ imco-cn-Ihpw am\-kn-I-hp-amb ]n´pW F\n¡v ho«nÂ \n¶pw In«m-dp-­v.

19. imkv{Xo-b-amb Ah-t\_m[w e`n-¡p-¶-Xn-\mbn imkv{X-]-T-\-¯n\v ap³Xq¡w \ÂI-W-sa¶v amXm-]n-Xm-¡Ä Fs¶ HmÀ½-s¸-Sp-¯m-dp-­v.

20. ]{X-am-[y-a-§-fnÂ hcp¶ B\p-Im-enI I­p-]n-Sp-¯-§Ä tkmjyÂ aoUn-b-bnÂ hcp¶ KWn-X-]-knÂkv F¶n-h-sb-¡p-dn¨v A²ym-]nI ¢mknÂ NÀ¨ sN¿m-dp-­v.

21. kb³knÂ Rms\mcp ]co-£-W-¯nÂ ]cm-P-b-s¸-«mÂ AXv ho­pw ho­pw \S¯n kabw If-bm³ Fsâ a\Êv A\p-h-Zn-¡m-dn-Ã.

22. hnhn-[-Xcw Bi-b-§sf Ipdn¨v a\-Ên-em-¡m\pw kml-Ncyw hni-I-e\w sN¿m\pw \_p²n-]qÀÆw Hcp Xocp-am-\-sa-Sp-¡m\pw imkv{X-]-T\w klm-b-I-am-Wv.

23. hmÀjnI ]co£ \S-¯p¶ ka-b-§-fnÂ apgp-h³ ]mT-`m-K-§fpw Hcp-an¨p ]Tn-t¡­n hcp-atÃm F¶ Nn´ Fs¶ hymIp-e-s¸-Sp-¯m-dp-­v.

24. ]co-£W klm-b-¯m-epÅ imkv{X-]-T\w Fsâ imkv{X hnj-b-§-tfm-SpÅ Xmev]-cy-§Ä¡v Hcp Imc-W-am-Wv.

25. kb³kp-ambn \_Ô-s¸« ]co-£-W-§Ä ImWp-t¼mÄ AXn\v ]n¶n-epÅ imkv{X X¯z-§sf Ipdn¨v Rm³ Nn´n-¡m-dp­v

26. kb³kv ]pkvX-I-§Ä hmbn-¡p-¶Xpw kb³kv FIvkn-\_n-j³ kµÀin-¡p-¶-XpXw F\n-¡n-jvS-am-Wv.

27. samss\_Â B¸v hgn-bpÅ imkv{X-]-T\w Rm³ {]tbm-P-\-s¸-Sp-¯m-dp-­v.

28. Rm³ kb³kv hnj-b-¯n\v ]n¶nÂ Bhp-t¼mÄ Fs¶ apt¶m«v \bn-¡m³ kplr-¯p-¡Ä klm-bn-¡m-dp-­v.

29. F\n¡v kb³kv hnj-b-§Ä ]Tn-¡p-¶-XnÂ {]bmkw hcp-t¼mÄ Fsâ c£n-Xm-¡Ä AXnsâ ImcWw At\z-jn-¡p-Ibpw AXv ]cn-l-cn-¡p-¶-Xn-\pÅ th­n-bpÅ \S-]-Sn-IÄ kzoI-cn-¡p-Ibpw sN¿m-dp-­v.

30. am\-hnI hnj-b-§-tf-¡mÄ IqSp-XÂ {]m[m\yw kb³kv hnj-b-§-fnÂ ]Tn-¡m-\mWv Fsâ c£n-Xm-¡Ä {i² \ÂIm-dp-Å-Xv.

31. kb³kpambn \_Ô-s¸« B\p-Im-enI I­p-]n-Sp-¯-§Ä, hnh-c-§Ä F¶nh ¢mÊnepÅ \_pÅän³ t\_mÀUnÂ {]ZÀin-¸n-¡m-dp-­v.

32. ]co-£-bv¡p-th­n X¿m-sd-Sp-¡p¶ ka-b¯v BhÀ¯n¨v hmbn-¡p-t¼mÄ CsXÃmw X\n¡v ]co-£m-k-a-b¯v HmÀ½ D­m-hptam F¶ Bi¦ D­m-hp-Ibpw AXp-hgn ]co-£-bnÂ tXmÂ¡ptam F¶ Nn´bpw D­m-hm-dp-­v.

33. ASp-¯-Sp¯ Znh-k-§-fnÂ ]co-£-IÄ hcp-t¼mÄ ]Tn¨ Imcy-§Ä Xs¶ HmÀ½-bnÂ kq£n-¡phm³ ]e-t¸mgpw Ign-bm-dn-Ã.

34. imkv{X-¯nse \nb-a-§fpw XXz-§fpw Adn-ªmÂ am{Xta \ap¡v \sÃmcp PohnXw \bn-¡m-\mhpw F¶v Rm³ hniz-kn-¡p-¶p.

35. kb³kv ]T\w Fs¶ GsXmcp Imcy-¯n-epw bpàn-]-c-ambn Nn´n-¡m\v t{]cn-¸n-¡m-dp-­v.

36. Pohn-X-ssi-ensb henb coXn-bnÂ kzm[o-\n-¡m³ imkv{Xo-b-amb hnI-k\w Bh-iy-amWv F¶v F\n¡v Adn-bmw.

37. kb³kv FIvkn-\_n-j-\nse imkv{X-I-­p-]n-Sp-¯-§Ä ImWp-t¼mÄ CXp-t]m-se-bpÅ I­p-]n-Sp-¯-§Ä Fs¶sIm­v Ign-bptam F¶v Rm³ Nn´n-¡m-dp-­v.

38. ¹m\-täm-dnbw kb³kv ayqknbw imkv{X-hp-ambn \_Ô-s¸« aäv Øm]-\-§Ä kµÀin-¡m³ F\n¡v CjvS-am-Wv.

39. hnhn[ Sn.-hn. Nm\-ep-I-fnse kb³kv kw\_-Ô-amb ]cn-]m-Sn-IÄ Rm³ ImWm³ {ian-¡m-dp-­v.

40. kb³kv imkv{X-Ú-·m-cpsS Nn{X-§Ä tiJ-cn-¡p-¶Xpw Ah-cpsS I­p-]n-Sp-¯-§-sf-¡p-dn¨v ]Tn-¡p-¶Xpw F\n¡v Xmev]-cy-ap-Å-Xm-Wv.

41. \qX-\-imkv{X kmt¦-Xn-I-hn-Zy-IÄ D]-tbm-Kn-¨pÅ kn\n-a-IÄ, ImÀ«q-Wp-IÄ, sKbn-ap-IÄ XpS-§n-bh F\n¡v hf-sc-b-[nIw ckw ]I-cp-¶-Xm-Wv.

42. F\n¡v Hcp t\«-ap-s­-¦nÂ B hnP-b-¯nÂ Fsâ kplr-¯p-¡Ä kt´mjw Is­-¯m-dp-­v.

43. imkv{X-hn-j-b-¯nÂ D¶X amÀ¡v e`n-¡p-t¼mÄ c£n-Xm-¡Ä Fs¶ A`n-\-µn-¡m-dp-­v.

44. kb³kv hnj-b-§-fmb ^nkn-Ivkv, sIan-kv{Sn, \_tbm-fPn F¶o hnj-b-§Ä ]Tn-¡p-¶-Xn-\mbn Fsâ c£n-Xm-¡Ä Syqj³ ¢mÊp-IÄ Xc-s¸-Sp¯n Xcm-dp-­v.

45. kb³knse Fsâ ]cm-P-b-§Ä ]co-£-I-fntem {]hÀ¯-\-§-fntem hcp-t¼mÄ AX Bß-]-cn-tim-[-\bv¡v hnt[-b-am-¡p-Ibpw ]n¶oSv AXv sa¨-s¸-Sp-¯m³ th­n-bpÅ {]hÀ¯-\-§-fnÂ GÀs¸-Sm-dp-­v.

46. imkv{X-¯nsâ IpXn-¨p-Nm«w P\-§-fpsS Pohn-X-\n-e-hmcw DbÀ¯m³ klm-b-I-amIpw F¶v Rm³ hniz-kn-¡p-¶p.

47. Fsâ Hgnhp ka-b-§Ä IqSp-Xepw kabw kb³kpambn \_Ô-s¸« {]hÀ¯-\-§-fnÂ (]qt´m« \nÀ½m-Ww, kb³kv ¢ºv) BWv apgp-Im-dp-Å-Xv.

**APPENDIX II**

**FINAL (Malayalam version)**

**ATTITUDE TOWARDS SCIENCE SCALE(2018)**

**FAROOK TRAINING COLLEGE**

Dr. Aseel Abdul Wahid Anjusha A.M

Asst. Professor M.Ed Student

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Kozhikode Kozhikode

**\nÀt±-i-§Ä**

imkv{X-hn-j-b-§-fmb ^nkn-Ivkv, sIan-kv{Sn, \_tbm-f-Pn XpS-§nb hnj-b-§-fn-epÅ \n§-fpsS at\m-`mhw Adn-bm-\pÅ Nne {]kvXm-h-\-IÄ BWv Xmsg sImSp-¯n-cn-¡p-¶-Xv. Xmsg X¶n-cn-¡p¶ Hmtcm {]kvX-hm-\bv¡pw ]qÀ®-ambn tbmPn-¡p-¶p, A`n-{]m-b-an-Ã, hntbm-Pn-¡p-¶p, ]qÀ®-ambn hntbm-Pn-¡p¶p F¶n-§s\ A©p {]Xn-I-c-W-§-fp-­v. Ah D¯-c-¡-S-em-knÂ Hmtcm {]kvXm-]-\-bp-sSbpw {Ia \¼-dn\v t\sc tcJ-s¸-Sp-¯n-bn-cn-¡p-¶p. \n§-fpsS {]Xn-I-cWw A\p-tbm-Py-amb D¯-c-¯n\v Xmsg icn NnÓw (✓) D]-tbm-Kn¨v AS-bm-f-s¸-Sp-¯p-I. Hcp {]kvXm-h-\bv¡v Hcp D¯cw am{Xta tcJ-s¸-Sp-¯m-hq.

1. imkv{Xm-²ym-]nI ¢mkv FSp-¡p¶ ka-b¯v F\n¡v a\-Ên-em-hm¯ Imcy-§Ä Rm³ kwibw tNmZn-¡m-dp-­v.

2. ]T\ {]hÀ¯-\-§Ä kwL{]hÀ¯-\-§-fmbn A²ym-]nI \ÂIp-¶-Xn-eqsS Fsâ imkv{X-]-T\w sa¨-s¸-Sp-¯m³ AXv klm-bn-¡m-dp-­v.

3. imkv{Xm-²ym-]nI ¢mkv FSp-¡p¶ ka-b¯v CSbv¡v tNmZyw tNmZn-¡p-t¼mÄ Rm³ tNmZn-¡p¶ tNmZy-§Ä sXäptam, AsÃ¦nÂ aäp-Å-hÀ Ifn-bm-¡ptam F¶ Imc-W-¯mÂ Rm³ kwi-b-§Ä tNmZn-¡m³ aSn-¡m-dp-­v.

4. imkv{Xm-²ym-]nI ¢mkv FSp-¡p¶ ka-b¯v Cu ]mT-`m-K-§-fnÂ FÃmw ImWm-]mTw ]Tn-t¡-­n-h-cptamsb¶v Rm³ Nn´n-¡m-dp­v

5. F.-]n.-sP. A\_vZpÄ Iemw, kn.-hn. cma³ XpS-§nb {]Xn-`m-im-en-I-fmb imkv{X-Ú-·m-cpsS imkv{X kw`m-h-\-Isf¡pdn¨v a\-Ên-em-¡p-t¼mÄ Ahsc t]mse X\n¡pw BI-W-sa¶v Rm³ B{K-ln-¡m-dp-­v.

7. imkv{Xm-²ym-]nI ¢mknÂ F´v, F§-s\, F´p-sIm­v F¶n-§-s\-bpÅ tNmZy-§Ä tNmZn-¨p-sIm­v imkv{X-¯n-epÅ ]e Bi-b-§fpw Is­-¯p-¶-Xn-\mbn t{]mÕm-l\w \ÂIm-dp-­v.

8. tcmK-§-sf-¡p-dn¨pw AXn-s\-Xn-cmb NnIn-Õ-I-sf-¡p-dn¨pw Hcp hyà-amb [mcW \ap¡v imkv{X-]-T-\-¯n-eqsS am{Xta e`n-¡p-I-bp-Åq.

9. kvamÀ«v ¢mkv D]-tbm-Kn-¨pÅ imkv{Xm-²ym-]n-I-bpsS hnj-bm-h-X-cWw kb³kv hnj-b-t¯m-SpÅ Fsâ Xmev]cyw hÀ²n-¡m³ Imc-W-am-Im-dp­v

10. bqSyq-\_nse imkv{X-hp-ambn \_Ô-s¸« hoUn-tbm-IÄ ImWm³ Rm³ {ian-¡m-dp-­v.

11. imkv{X {]m[m-\y-apÅ Øe-§-fn-te¡v ^oÂUv {Sn¸v t]mIp-¶Xv F\n¡v B\µw ]I-cp-¶-Xm-Wv.

12. Bh-iy-apÅ kµÀ`-§-fnÂ X§-fpsS ¢mkp-IÄ Xpd-Êmb Øe-t¯m, sse{\_-dn-bntem et\_m-d-«-dn-bntem sh¨v \S-¯m³ A[ym-]nI {ian-¡m-dp-­v.

13. A²ym-]nI D¯-c-t]-¸À ¢mÊnÂ hnX-cWw sN¿p-t¼mÄ ap¼v In«nb amÀ¡nt\-¡mÄ Ipd-bptam F¶v Rm³ hymIp-e-s¸-Sm-dp-­v.

14. Fsâ kplr-¯p-¡Ä Bsc-¦nepw imkv{X-]-T-\-¯nÂ {]bm-k-a-\p-`-hn-¡p-t¼mÄ Rm\-hsc Fs¶s¡m­v Ign-bpw-hn[w klm-bn-¡m-dp-­v.

15. Fsâ kplr-¯p-¡-fnÂ Bsc-¦nepw imkv{X-hp-ambn \_Ô-s¸« t\«w D­m-bn-«p-s­-¦nÂ Rm³ AXnÂ A`n-am\w sImÅm-dp-­v.

16. imkv{X-]-T-\-¯n\v th­ imco-cn-Ihpw am\-kn-I-hp-amb ]n´pW F\n¡v ho«nÂ \n¶pw In«m-dp-­v.

17. imkv{Xo-b-amb Ah-t\_m[w e`n-¡p-¶-Xn-\mbn imkv{X-]-T-\-¯n\v ap³Xq¡w \ÂI-W-sa¶v amXm-]n-Xm-¡Ä Fs¶ HmÀ½-s¸-Sp-¯m-dp-­v.

18. ]{X-am-[y-a-§-fnÂ hcp¶ B\p-Im-enI I­p-]n-Sp-¯-§Ä tkmjyÂ aoUn-b-bnÂ hcp¶ KWn-X-]-knÂkv F¶n-h-sb-¡p-dn¨v A²ym-]nI ¢mknÂ NÀ¨ sN¿m-dp-­v.

19. kb³knÂ Rms\mcp ]co-£-W-¯nÂ ]cm-P-b-s¸-«mÂ AXv ho­pw ho­pw \S¯n kabw If-bm³ Fsâ a\Êv A\p-h-Zn-¡m-dn-Ã.

20. hnhn-[-Xcw Bi-b-§sf Ipdn¨v a\-Ên-em-¡m\pw kml-Ncyw hni-I-e\w sN¿m\pw \_p²n-]qÀÆw Hcp Xocp-am-\-sa-Sp-¡m\pw imkv{X-]-T\w klm-b-I-am-Wv.

21. hmÀjnI ]co£ \S-¯p¶ ka-b-§-fnÂ apgp-h³ ]mT-`m-K-§fpw Hcp-an¨p ]Tn-t¡­n hcp-atÃm F¶ Nn´ Fs¶ hymIp-e-s¸-Sp-¯m-dp-­v.

22. ]co-£W klm-b-¯m-epÅ imkv{X-]-T\w Fsâ imkv{X hnj-b-§-tfm-SpÅ Xmev]-cy-§Ä¡v Hcp Imc-W-am-Wv.

23. kb³kp-ambn \_Ô-s¸« ]co-£-W-§Ä ImWp-t¼mÄ AXn\v ]n¶n-epÅ imkv{X X¯z-§sf Ipdn¨v Rm³ Nn´n-¡m-dp­v

24. kb³kv ]pkvX-I-§Ä hmbn-¡p-¶Xpw kb³kv FIvkn-\_n-j³ kµÀin-¡p-¶-XpXw F\n-¡n-jvS-am-Wv.

25. samss\_Â B¸v hgn-bpÅ imkv{X-]-T\w Rm³ {]tbm-P-\-s¸-Sp-¯m-dp-­v.

26. Rm³ kb³kv hnj-b-¯n\v ]n¶nÂ Bhp-t¼mÄ Fs¶ apt¶m«v \bn-¡m³ kplr-¯p-¡Ä klm-bn-¡m-dp-­v.

27. F\n¡v kb³kv hnj-b-§Ä ]Tn-¡p-¶-XnÂ {]bmkw hcp-t¼mÄ Fsâ c£n-Xm-¡Ä AXnsâ ImcWw At\z-jn-¡p-Ibpw AXv ]cn-l-cn-¡p-¶-Xn-\pÅ th­n-bpÅ \S-]-Sn-IÄ kzoI-cn-¡p-Ibpw sN¿m-dp-­v.

28. am\-hnI hnj-b-§-tf-¡mÄ IqSp-XÂ {]m[m\yw kb³kv hnj-b-§-fnÂ ]Tn-¡m-\mWv Fsâ c£n-Xm-¡Ä {i² \ÂIm-dp-Å-Xv.

29. kb³kpambn \_Ô-s¸« B\p-Im-enI I­p-]n-Sp-¯-§Ä, hnh-c-§Ä F¶nh ¢mÊnepÅ \_pÅän³ t\_mÀUnÂ {]ZÀin-¸n-¡m-dp-­v.

30. ]co-£-bv¡p-th­n X¿m-sd-Sp-¡p¶ ka-b¯v BhÀ¯n¨v hmbn-¡p-t¼mÄ CsXÃmw X\n¡v ]co-£m-k-a-b¯v HmÀ½ D­m-hptam F¶ Bi¦ D­m-hp-Ibpw AXp-hgn ]co-£-bnÂ tXmÂ¡ptam F¶ Nn´bpw D­m-hm-dp-­v.

31. imkv{X-¯nse \nb-a-§fpw XXz-§fpw Adn-ªmÂ am{Xta \ap¡v \sÃmcp PohnXw \bn-¡m-\mhpw F¶v Rm³ hniz-kn-¡p-¶p.

32. kb³kv ]T\w Fs¶ GsXmcp Imcy-¯n-epw bpàn-]-c-ambn Nn´n-¡m\v t{]cn-¸n-¡m-dp-­v.

33. Pohn-X-ssi-ensb henb coXn-bnÂ kzm[o-\n-¡m³ imkv{Xo-b-amb hnI-k\w Bh-iy-amWv F¶v F\n¡v Adn-bmw.

34. ¹m\-täm-dnbw kb³kv ayqknbw imkv{X-hp-ambn \_Ô-s¸« aäv Øm]-\-§Ä kµÀin-¡m³ F\n¡v CjvS-am-Wv.

35. hnhn[ Sn.-hn. Nm\-ep-I-fnse kb³kv kw\_-Ô-amb ]cn-]m-Sn-IÄ Rm³ ImWm³ {ian-¡m-dp-­v.

36. kb³kv imkv{X-Ú-·m-cpsS Nn{X-§Ä tiJ-cn-¡p-¶Xpw Ah-cpsS I­p-]n-Sp-¯-§-sf-¡p-dn¨v ]Tn-¡p-¶Xpw F\n¡v Xmev]-cy-ap-Å-Xm-Wv.

37. \qX-\-imkv{X kmt¦-Xn-I-hn-Zy-IÄ D]-tbm-Kn-¨pÅ kn\n-a-IÄ, ImÀ«q-Wp-IÄ, sKbn-ap-IÄ XpS-§n-bh F\n¡v hf-sc-b-[nIw ckw ]I-cp-¶-Xm-Wv.

38. F\n¡v Hcp t\«-ap-s­-¦nÂ B hnP-b-¯nÂ Fsâ kplr-¯p-¡Ä kt´mjw Is­-¯m-dp-­v.

39. imkv{X-hn-j-b-¯nÂ D¶X amÀ¡v e`n-¡p-t¼mÄ c£n-Xm-¡Ä Fs¶ A`n-\-µn-¡m-dp-­v.

40. kb³kv hnj-b-§-fmb ^nkn-Ivkv, sIan-kv{Sn, \_tbm-fPn F¶o hnj-b-§Ä ]Tn-¡p-¶-Xn-\mbn Fsâ c£n-Xm-¡Ä Syqj³ ¢mÊp-IÄ Xc-s¸-Sp¯n Xcm-dp-­v.

41. kb³knse Fsâ ]cm-P-b-§Ä ]co-£-I-fntem {]hÀ¯-\-§-fntem hcp-t¼mÄ AX Bß-]-cn-tim-[-\bv¡v hnt[-b-am-¡p-Ibpw ]n¶oSv AXv sa¨-s¸-Sp-¯m³ th­n-bpÅ {]hÀ¯-\-§-fnÂ GÀs¸-Sm-dp-­v.

42. imkv{X-¯nsâ IpXn-¨p-Nm«w P\-§-fpsS Pohn-X-\n-e-hmcw DbÀ¯m³ klm-b-I-amIpw F¶v Rm³ hniz-kn-¡p-¶p.

43. Fsâ Hgnhp ka-b-§Ä IqSp-Xepw kabw kb³kpambn \_Ô-s¸« {]hÀ¯-\-§-fnÂ (]qt´m« \nÀ½m-Ww, kb³kv ¢ºv) BWv apgp-Im-dp-Å-Xv.

**APPENDIX III**

**DRAFT (English Version)**

**ATTITUDE TOWARDS SCIENCE SCALE (2018)**

**FAROOK TRAINING COLLEGE**

Dr. Aseel Abdul Wahid Anjusha A.M

Asst. Professor M.Ed Student

Farook Training College Farook Training College

Kozhikode Kozhikode

**Instructions**

The following are some statement to show your attitude towards science, such as physics, chemistry and biology. Each statement has five responses given below. 'Strongly Agree', 'Agree', 'Undecided', 'Disagree', 'Strongly disagree'. Read each statement carefully and which response suits you most. Use the tick mark for the most apt response against the number of the statement in the response sheet. Take care to mark responses for all statements.

1. What I don't understand when taking a science teacher class is that I have to question myself.
2. Teachers can help to improve science by providing teaching activities as team work.
3. When the science teacher takes the class, I hesitate to ask questions because others are teasing or wrong.
4. I wonder if I should learn to watch all the lessons while taking a class in science.
5. When I understand the scientific contributions of talented scientists like APJ Abdul Kalam ,C V Raman, I want to be like him.
6. I get the impression that I should get more marks in science than others.
7. Science Teacher encourages many discovery of science concepts by asking questions such as what and why in class
8. Only through scientific study can we get a clear understanding of diseases and treatments.
9. The thought of getting the intended result while doing science teacher lab activities makes me curious.
10. The science teacher's use of smart class material has led to increased interest in science.
11. I try to watch science related videos on YouTube.
12. Going on a field trip to places where science is important is what gives me pleasure
13. I would compare my marks to the science that my friends got.
14. Whenever necessary, the teacher may arrange for her classes to be held in the open air or in the laboratory of the library.
15. I doubt if the teacher answer sheet will be less than the marks obtained earlier in the class.
16. When some of my friends are having trouble with science, I help them as much as I Can
17. If any of my friends have had any science-related achievement, I would be proud of it.
18. I get the physical and mental support I need at home to study science.
19. My parents reminded me that in order to gain scientific awareness, science education should be a priority.
20. Teacher Discusses science related Discoveries in Newspapers and Maths in Social Media.
21. In science, if I fail an experiment, my mind does not allow me to repeat it again and again.
22. Scientific study can help you make a wise decision by understanding the various concepts and analyzing the situation.
23. It bothers me that the whole lesson needs to be studied together during the annual exams.
24. Experimental aided science study is a cause for interest in science topics.
25. When I look at science-related experiments, I think about the science behind it.
26. I like reading science books and visiting science exhibitions.
27. l take advantage of the scientific study through mobile app.
28. When I am behind my goals, friends help me move forward.
29. When I have difficulty studying science, I look for my parents' cause and take action to solve there.
30. My parents pay close attention to study science than other science subjects.
31. Science-related periodical discoveries and information are displayed on the bulletin board of the class.
32. When preparing for the exam repeatedly, you are worried that you will recall all this while thinking that you will fail the exam.
33. When exams are coming in the consecutive days, they are often unable to remember what they have learned.
34. I believe that we can lead a good life only if we know the laws and principles of science.
35. The study of science will lead me to think rationally about anything.
36. I know that scientific development is needed to make a big impact on lifestyle.
37. Watching the scientific discoveries at the Science Exhibition makes me wonder if such discoveries could be made by me.
38. I like to visit the Planetarium Science Museum and other science-related Institutions
39. I try to watch science related programs on various TV channels.
40. I am interested in collecting images of science scientists and studying their discovery .
41. Movies, cartoons, games and games with the latest science techniques make me very entertained.
42. If I have any advantage, my friends have to find happiness in that success.
43. Parents have to congratulate me on getting high marks in science.
44. My parents give me tuition classes to study science subjects like Physics Chemistry and Biology.
45. When I fail in science, I undergo a self-examination and then work on improvement.
46. I believe that the rise of science will also help improve people's quality of life.
47. Most of my spare time is full of science related activities.( Garden making, science club)

**APPENDIX IV**

**FINAL (English Version)**

**ATTITUDE TOWARDS SCIENCE SCALE (2018)**

**FAROOK TRAINING COLLEGE**

**Dr. Aseel Abdul Wahid Anjusha A.M**

Asst. Professor M.Ed Student

Farook Training College Farook Training College

Kozhikode Kozhikode

**Instructions**

The following are some statement to show your attitude towards science, such as physics, chemistry and biology. Each statement has five responses given below. Read each statement carefully and which response suits you most. Use the tick mark for the most apt response against the number of the statement in the response sheet. Take care to mark responses for all statements.

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2. Teachers can help to improve science by providing teaching activities as team work.
3. When the science teacher takes the class, I hesitate to ask questions because others are teasing or wrong.
4. I wonder if I should learn to watch all the lessons while taking a class in science.
5. When I understand the scientific contributions of talented scientists like APJ Abdul Kalam ,C V Raman, I want to be like him.
6. I get the impression that I should get more marks in science than others.
7. Science Teacher encourages many discovery of science concepts by asking questions such as what and why in class
8. Only through scientific study can we get a clear understanding of diseases and treatments.
9. The science teacher's use of smart class material has led to increased interest in science.
10. I try to watch science related videos on YouTube.
11. Going on a field trip to places where science is important is what gives me pleasure
12. Whenever necessary, the teacher may arrange for her classes to be held in the open air or in the laboratory of the library.
13. I doubt if the teacher answer sheet will be less than the marks obtained earlier in the class.
14. When some of my friends are having trouble with science, I help them as much as I Can
15. If any of my friends have had any science-related achievement, I would be proud of it.
16. I get the physical and mental support I need at home to study science.
17. My parents reminded me that in order to gain scientific awareness, science education should be a priority.
18. Teacher Discusses science related Discoveries in Newspapers and Maths in Social Media.
19. In science, if I fail an experiment, my mind does not allow me to repeat it again and again.
20. Scientific study can help you make a wise decision by understanding the various concepts and analyzing the situation.
21. It bothers me that the whole lesson needs to be studied together during the annual exams.
22. Experimental aided science study is a cause for interest in science topics.
23. When I look at science-related experiments, I think about the science behind it.
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26. When I am behind my goals, friends help me move forward.
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40. My parents give me tuition classes to study science subjects like Physics Chemistry and Biology.
41. When I fail in science, I undergo a self-examination and then work on improvement.
42. I believe that the rise of science will also help improve people's quality of life.
43. Most of my spare time is full of science related activities.( Garden making, science club)

**APPENDIX V**

**RESPONSE SHEET**

Name of the School:

Male □ Female □

Urban□ Rural □ State □ CBSE □

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sl. No. | Strongly Agree | Agree | Undecided | Disagree | Strongly disagree |  | Sl. No. | Strongly Agree | Agree | Undecided | Disagree | Strongly disagree |
| 1 |  |  |  |  |  |  | 25 |  |  |  |  |  |
| 2 |  |  |  |  |  |  | 26 |  |  |  |  |  |
| 3 |  |  |  |  |  |  | 27 |  |  |  |  |  |
| 4 |  |  |  |  |  |  | 28 |  |  |  |  |  |
| 5 |  |  |  |  |  |  | 29 |  |  |  |  |  |
| 6 |  |  |  |  |  |  | 30 |  |  |  |  |  |
| 7 |  |  |  |  |  |  | 31 |  |  |  |  |  |
| 8 |  |  |  |  |  |  | 32 |  |  |  |  |  |
| 9 |  |  |  |  |  |  | 33 |  |  |  |  |  |
| 10 |  |  |  |  |  |  | 34 |  |  |  |  |  |
| 11 |  |  |  |  |  |  | 35 |  |  |  |  |  |
| 12 |  |  |  |  |  |  | 36 |  |  |  |  |  |
| 13 |  |  |  |  |  |  | 37 |  |  |  |  |  |
| 14 |  |  |  |  |  |  | 38 |  |  |  |  |  |
| 15 |  |  |  |  |  |  | 39 |  |  |  |  |  |
| 16 |  |  |  |  |  |  | 40 |  |  |  |  |  |
| 17 |  |  |  |  |  |  | 41 |  |  |  |  |  |
| 18 |  |  |  |  |  |  | 42 |  |  |  |  |  |
| 19 |  |  |  |  |  |  | 43 |  |  |  |  |  |
| 20 |  |  |  |  |  |  | 44 |  |  |  |  |  |
| 21 |  |  |  |  |  |  | 45 |  |  |  |  |  |
| 22 |  |  |  |  |  |  | 46 |  |  |  |  |  |
| 23 |  |  |  |  |  |  | 47 |  |  |  |  |  |
| 24 |  |  |  |  |  |  |  |  |  |  |  |  |