A STUDY OF SCIENTIFIC INTEREST AMONG HIGHER SECONDARY SCHOOL STUDENTS OF JAMMU DISTRICT

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CERTIFICATE

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LIST OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX

CHAPTER-1
INTRODUCTION

CHAPTER - 1

INTRODUCTION

1.1 INTRODUCTION

Education is one of the most important factors in achieving the national goals of a country. In the present age of Science and Technology, it has been increasingly realized that one needs to be educated not only to become a better man and better social being, but he should also be a better creative and productive being. Education is a social concept, philosophically evolved, psychologically developed and socially based."The whole of education, intellectual, moral and physical consisted in leading out the innate knowledge, virtues and powers of the child making the potential, actual".

Education provide standards to good citizenry in search for solutions to problems such as corruption, gender discrimination and emerging issues including global warming, religious radicalization and terrorism. In school, all the subjects are taught because they provide liberal education. They are the part of equipment and preparation for life which we expect the school to give to its pupils, so that they may play their role in the community as intellectual citizens. Science is one among those subjects, which is an essential element in education. Science is of great importance and introduces new ways of thinking, reasoning and living. It develops the consciousness among the pupils.

Science education has become an integral part of school education. The quality of science teaching, so, is to be developed considerably so as to achieve its purposes and objectives, namely, to understand basic principles, to develop problem solving, analytical skills and ability to apply them to the problems of material environment and social living besides promoting the spirits material environment and social living besides promoting the spirits of enquiry and experimentation.

In this modern world dominated by science and technology, science teaching must be effective and innovative, and beneficial to pupils Education is a systematic process through which a child or an adult acquires knowledge,

experience, skill and sound attitude. It makes an individual civilised, refined, cultured and educated. Every society has to give importance to education because it is a panacea for all evils and key to solve the various problems of life. An educated person is socially conscious, morally upright, culturally distinct and yet nationally integrated. Education is a unique feature that plays the most dominant role in the life and evaluation of mankind. Hence education at all levels namely- Primary, Middle, Secondary, Higher secondary and Higher education plays an important role in shaping, sharpening and refining personality of the person.

Education is important to all living beings and it should be provided to all individuals for their all-around development. The strength of a nation depends upon how well educated its citizens are. Education has occupied a supreme place of special importance, because it moulds the personality of our children who are the future citizens of our nation. Education enables an individual to use his potentiality to the maximum extent. Education modifies the behavior of the younger generation, in a desired direction. In this regard school plays a significant role. School is an important, primary unit of society because it has a crucial responsibility of preparing the prospective citizens of the nation.

This indeed has been rightly expressed in Kothari Education Commission's report (1964- 1966) that "The destiny of our nation is shaped in her classrooms" In Rig-Veda, Education has been defined as that which makes man self-reliant and selfless. According to Swami Vivekananda Education is not the amount of information that is put into one's brain, rather it should be life building and man making character. He also emphasized that "Education is the manifestation of perfection which is already in man". As stated in the University Education Commission's report, Education according to Indian traditions is not merely a means of earning a living or it is a nursery of earning a living thought or school for citizenship. It is the imitation into the life of spirit, training of human souls in the pursuit of truth and practice of virtue. It is the second birth "Divityam Janma".

According to Ridden, Education is the deliberate, the systematic influence exerted by a mature person upon immature, through instruction, discipline and harmonious development of physical, intellectual, aesthetic, social and spiritual powers of human being, for the individual and social values are directed towards

the union of the educand with his creator as the final end, so education is the background of any progressing nation. Science has helped man to acquire supremacy over nature. It has greatly affected the way the people view themselves and the world around them. The wonderful achievements of science have glorified the modern world and illuminated the human creative potential. In ancient times most of the people believed that natural events and everything that happens to them is because of the actions of God and spirit, but the ancient Greeks were among the first to use systematic observation and reasoning to analyze natural happenings. As scientific creativity, thinking gradually developed, nature was seen less and less as the product of mysterious spiritual forces.

Science in literal sense, means the pursuit of knowledge, the word science comes from the Latin word scientia which means to know. The term science in the sense of knowledge was used for a long time to include the entire subject matter of study though it is correct it does not imply that all knowledge is science. This is very clear by the fact that all the branches of social sciences and humanities are universally excluded from the purview of science. Thus the facility to measure, quantify and verify the object in question is part of science and its conclusions are universal. The body of knowledge in science is factual and verifiable and the results are data based. Hence many efforts were made to arrive at a precise meaning and definition of the word science.

Science has revolutionized our lifestyle and brought about changes in thinking, attitudes, outlooks etc. Science is almost like a deaf and dumb girl who comes with poisonous gas and atom bomb in one hand and aesthetics and penicillin in the other hand. Right from cradle to grave all human activities are controlled and fashioned by Science. Science has so much entered everyday life activities and without it, man's existence is difficult on this Earth. Also it develops insight into the mysteries of creation and existence which have always attracted the attention of man since the dawn of civilization. Besides satisfying the intellectual curiosity of man and providing materials and media for intellectual exercise, Science has a disciplinary effect on the minds of man and also through its countless manifestations; man was able to invent innumerable

ways of making his life comfortable and happy. There is no aspect of man's life today which has not been influenced by Science in one way or the other.

Science has revolutionized every sphere of life and has undoubtedly done a great service to mankind. Science is included in the school curriculum, to develop properly the power of thinking, reasoning, curiosity, open-mindedness and ultimately to develop scientific attitudes which may create the future scientists of the emerging world whom we are eagerly looking for our progress. Scientific-Interest improves a pupil's self-esteem, motivation and achievement. The pupils, who are encouraged to think creatively and independently, become more interested in discovering things for themselves, more open to new ideas, work and explore ideas. Scientific creativity, scientific attitude and scientific interest prepare pupils for life; the pupils who are creative will be prepared for a rapidly changing world, where they may have to adapt to several careers in life time. Scientific creativity, scientific attitude and scientific interest are central to the way society functions in an obvious way through science, technology and myriad other manifestations. It is very essential to help the young talents to develop their innate desire to be creative and to shape their personality. Hence there is a need to guide and develop the younger individuals in relation to their scientific creativity, scientific interest and academic achievement.

An interest is a subjective attitude motivating a person to perform a certain task. It affords pleasure and satisfaction. It results in curiosity towards the object of interest, enthusiasm to be attached to the object, strength of will to face difficulties while engaged in the task of one's interest, a definite change in behavior in the presence of the object characterized by attention and concentration.

Interest is a feeling of likening associated with a reaction, either actual or imagined to a specific thing or situation. Interest is a tendency to become absorbed in an experience and to continue it, while an aversion is a tendency to turn away from it to something else. Hence, Science learning provides training in scientific method and helps to develop a scientific interest in the learners. Therefore, science is now a compulsory subject in every system of school education right from the elementary level. There is a highly significant and positive association among scientific interest and achievement of higher

secondary school students. Therefore the science educators are required to promote the development of scientific attitude and scientific interest among the secondary school students. If necessary steps are taken the higher secondary school students will accomplish and achieve definite success in science education.

1.2 SCIENCE EDUCATION

Science literacy has become a vital necessity for anyone living in a world full of scientific research with each passing day. Anyone who lives in this rapidly evolving world should be involved in the discussions about the important technological and scientific activities of society and develop skills to apply them in the day to day life, in what sense it applies. Science education creates awareness on the effect of scientific knowledge in everyday life, for example, its applications in society, the management and conservation of the environment, the utilization of resources and production of goods. The need to include science education in the secondary school curriculum is mainly to enable students to develop scientific knowledge, skills and positive attitudes and scientific temper towards science and technology.

Science is a body of empirical, theoretical and practical knowledge about the natural world, produced by refresher making use of scientific methods which emphasize the observation, explanation and prediction of real world phenomena by experiment. Science is a subject which broadens the horizon of an individual and develops various skills and provides opportunities for the professional growth of an individual. New ideas often challenge old one's demand for a new Science and Technology structure which is the treatment for science.

The crucial role of science plays in the development of any nation has long been recognized. Science is the bedrock of technological development. Science as a dynamic human activity concerned with understanding the working of our world today. The progress, welfare and security of a nation depend on a rapid planned and sustained growth in the quality and extent of education and research in science. Science education being an important component of the education system should contribute to the solution of the problems of the country by developing a desirable understanding of skills, attitudes and values.

The term "Science" (Scientia) is etymologically synonymous with knowledge, which of course does not imply that all knowledge is Science. In the literal sense, science means the pursuit of knowledge .**Report of the Education Commission (1964-66)** has remarked "There is of course one thing about which we feel no doubt or hesitation: education, Science based and in coherence with Indian culture and values can alone provide the foundation and also the instrument for nation's progress, security and welfare. One of the goals for school science that underlies **the National Science Education Standard (1996)** is to educate students who are able to experience the richness and excitement of knowing about and understanding the natural world. In India, the government is concerned about the quality of science education and wants to make significant changes to the country's educational system.

1.2.1 Aims of science education

According to the National Focus Group on Teaching of Science, NCERT, broadly, the goals of science education are drawn from the six criteria of validity of science curriculum - cognitive, content, process, historical, environmental and ethical. Therefore, the aim of science education should enable the learner –

1. To conquer the knowledge of the facts and principles of science and its applications, accordingto the stages of cognitive development.
2. To train in the methods, processes and skills that will help in the generation and validation of scientific knowledge.
3. To develop a historical and evolving perspective of science and to empower them to perceive science as a social enterprise.
4. To relate to the environment (natural environment, artifacts and people), local as well as global, and to acknowledge the issues at the interface of science, technology and society.
5. To attain the theoretical as well as practical knowledge and technical skills to enter the world of work.
6. To cultivate the natural curiosity, aesthetic sense and creativity in science and technology.

7. To imbibe the values of honesty, integrity, compassion, concern for life and preservation of the ecology, and
8. To generate scientific temper, objectivity, critical thinking and freedom from fear and prejudice.

In order to achieve the above-mentioned aims of science education the learner should possess a certain level of scientific attitude and positive outlook towards learning of science. A better understanding of the term attitude and the interest related to it will further help in comprehending this characteristic of science education and its learning

1.2.2 Definitions of Science

According to Fitzpatrick (1960), "Science is a cumulative and endless series of empirical observations which result in the formation of concepts and theories with both concepts and theories being subject to modification in the light of further empirical observations. Science is both a body of knowledge and the process of acquiring it.''

According to Griggs (1990), "Science in fact is more than a subject: it is a method of acquiring knowledge.**"**

According the Schlesinger (2000), "Science is a process of the human intellect. It is a way of thinking, a way of doing, a method of discovering new relationships in the physical and biological universe."

1.2.3 Scientific interest

Science is a way of knowing and thinking about the natural and physical world. Science covers the broad field of knowledge that deals with observed facts and the relationship among those facts. Observing, measuring, inferring, classifying, predicting, and communicating are some of the skills fundamental to science. They are not only integral to science investigations, solving problems, and making decisions; but also they continue to science as a body of knowledge and a way of thinking. In addition, science inculcates intellectual, cultural, aesthetic, moral, utilitarian as well as vocational values peculiar to it.

Interest means “any aim or object which stimulates activity towards its attainment”. It refers to certain regularities of an individual’s feelings, thoughts and predispositions to act towards some aspects of his/her environment.

Interest is a great motivating force that persuades an individual to engage in cognitive, conative or affective behaviour. When the student develops science interest, he/she will always be curious and eager to undertake some science projects, visit places of scientific interest, read scientific literature and also try to meet and interact with some reputed persons of science, etc. They also actively participate in science fairs, exhibitions, debates, contests related to science. Science interests differ from each individual and they are unstable too.

Interests are actually acquired dispositions and the result of constant interaction between instinctive behaviour of the organism and the environmental forces. High intelligence and interest is essential for scientific achievement. Additional mental factors that appear to be associated with success in science are intellectual curiosity, ability to apply knowledge to new situations, retentive memory and insight into abstractions. Factors such as physical development, social and emotional maturity, moral character, attitudes, aptitudes and skills may also be the facets of science interest.

Science interest implies or shows an individual's interest in a science subject and how much the individual succeeded in scientific endeavour with his/her interest in science. Thus, the characteristics of able scientists suggest some of the criteria for locating individuals with interest in science. These characteristics include creative abilities, mental abilities, and capacity for critical thinking, ability to see relationships and also in more complex things which are related to their future.

A child shows interest in a thing that gives it satisfaction and as long as it gets satisfaction, it continues to evince interest in it. When satisfaction wanes, interest, too, wanes. Thus interest grows out of experiences that are satisfying and students will be more interested in the school subjects that give them sustained satisfaction. According to Grinnel (1992), young scientists learn about a particular area of science by working closely with established scientists. Some of what young science students acquire is taught to them explicitly, but much of what they learn is not. Instead they internalize the behaviour and interest patterns

of their science teachers. According to Redfield and Rousseau (1981) when teachers ask a majority of low level questions (e.g., identify, define, describe), students achievement does not reach the levels that are as high as those reached when students are asked mostly higher level questions (e.g., predict, justify, evaluate).

Teachers should not only ask questions that require them to evaluate, verify, infer casual relationships and draw conclusions, but they should also ask questions that should enable students to develop them to think like scientists. According to Hartman and Glasgow (2002), "Teachers can draw on different types of interest that students have in science. Personal interest is what students bring with them to the classroom or other environment; situational interest is something that students acquire by participating in activities in the classroom or other situations." So, teachers must create appropriate settings to develop student's interest in science. Situational factors such as interactive exhibits at museums tend to stimulate interest in science.

1.2.4 Concept of scientific interest

In the dictionary of Education (1959) scientific interest is defined as a pronounced innate capacity ability in a given line of endeavors such as a particular art, school subject or vocation. Thus scientific interest refers to an individual's inborn capacities or potentialities which are indicative of some special abilities.

Freeman (1965) has defined an interest as a combination of characteristics indicative of an individual's capacity to acquire some specific knowledge skill or set or organized responses such as ability to speak language to do mechanical work. These interests refer to an individual inborn capacity to acquire proficiency in a given area of human endeavours.

Scientific interest is a complex of interacting hereditary and environmental determinants producing predispositions / abilities that we can identify to an extent certain not all characteristics possessed by individuals who succeed late in scientific endeavours. Teaching is more than the presentation of facts.

Teaching is the development of new ways of thinking, a development that reveals itself in increased skills with the problems of life in new habits of actions in more

desirable attitude and aptitudes in benefiting personality and is an improved character. Science can justify its place in the curriculum only when it prejudices important changes in young pupils, change their ways of thinking in their habits of action and in the values they assign to what they have and what they do.

1.2.5 Importance of Scientific Interest

Nowadays, science educators realize that scientific interest plays a major role in the science enterprise and science teaching; unfortunately, few researchers have focused on exploring student's scientific creativity and improving or fostering student's creativity in science learning. Therefore both theoretical and pedagogical significance has been pursued in the present study. Theoretically, this study attempts to determine scientific interest among higher secondary students. The research results may help to determine the significant predictors of scientific interest and eventually find more appropriate ways to evaluate student's scientific interest.

If the findings of this study show a strong relation of scientific interest and some of the variables, science teachers may view scientific interest as an ability that can be taught rather than an innate, insightful, or fantastic ability. The research results will help teachers understand better which factors may affect student's scientific interest most. Therefore scientific interest can be enhanced through various means in classroom science teaching.

1.2.6. Factors influencing science interest:

Studies have identified factors influencing Interest towards Science. They are:

Gender influence: Numerous studies show that boys show more Science interest than girls, although this difference is stranger in physics than in biology. Girls do not choose science courses in spite of ability because they do not want to limit their vocational choices in scientific careers.

Classroom and teacher influence: Many studies show that classroom Environment has significant influence on students' Interest in Science. The most positive attitudes were associated with a high level of involvement and personal support, strong relationships with classmates and use of a variety of teaching strategies and unusual learning activities.

Curricular influence: Curriculum may have an effect on Interest because it gives a guideline for teaching.

Achievement influence: Achievement also influenced Science Interest.

1.2.7. Role of Science Teacher

National Policy of Education NPE in India of 1986 underlines the indispensable role of teachers in society and states that the status of teachers reflects the socio-cultural ethos of society. "Teachers should be given every opportunity to serve effectively, NEP calls for improved methods of recruitment and better pay scales for teachers. It stresses accountability linked with incentives and involvement of teachers in educational programmes.

Teachers need to be further professionally motivated and through learning. Teachers need to be oriented in subjects like science and technology. This would help the teachers to have better knowledge about the significance of science and technology. Above all teachers also should do some introspection and resolve to dedicate themselves to the service of learners and society. Their lifestyle should set a model to others in promoting scientific interest and scientific attitude. In every classroom, the most successful learning occurs when teachers are facilitators or activators of learning. Instead of giving formulaic sets of worksheets, tasks, or practice problems, teachers today are designing active, engaging learning experiences that build on student strengths and interests in sciences.

1.3 SIGNIFICANCE OF THE STUDY

The present research study has been taken to find out the scientific interest among the higher secondary students with respect to types of school, gender and area. Science has now become a compulsory subject in the school curriculum. Because of its multifarious value to the individuals as well as to the society. Science is a process of developing and cultivating the various powers, such as, mind, physical, mental and moral. Science is a fundamental right. So children develop interest in science. Science teaching by science educators and teachers is alike. The term "Interest in Science" has been employed to denote a range of meaning that extends from positive feeling towards science, to complete absorption is scientific inquiry. Science interest is highly valued in all human societies. If

education is to prepare children for a productive life in society, the educational system must accept responsibility for developing science interest.

Science has become an integral part of our life and living. In the present context we cannot think of a world without science. The wonderful achievements of science have glorified the modern world and transformed the modern civilization into a scientific civilization. It is a way of penetrating into unexplored and unmastered realms. The present generation rests on the firm foundation laid down by the scientists with their valuable contributions. Science is a way of knowing and thinking about the natural and physical world. Science covers the broad field of knowledge that deals with observed facts and the relationship among those facts. Observing, measuring, inferring, classifying, predicting, and communicating are some of the skills fundamental to science. They are not only integral to science investigations, solving problems, and making decisions; but also they continue to science as a body of knowledge and a way of thinking and interest is meant "any aim or object which stimulates activity towards its attainment". It refers to certain regularities of an individual's feelings, thoughts and predispositions to act towards some aspects of his/her environment.

Hence scientific interest is concerned with interest in conducting scientific activities for seeking accurate knowledge to conduct experiments to implement new ideas. It is concerned with the involvement of teachers in scientific activities. Disposition to engage in activities that are appropriate to some definite object or act. Hence it is also defined as a combination of characteristics indicative of an individual's capacity to acquire some specific knowledge, skill or set of organized responses in science. Science has brought about revolutionary changes in every walk of our life. Its impact is visible everywhere and in every aspect of our existence that is manifested in terms of vocational, social, economic, political, and cultural dimensions. Therefore in every country special attention is being given for the development of science. Science therefore occupies a very important place in curriculum both at school and university stages of education in India.

Science education is supposed to perform two fold tasks. Firstly, in individual perspective the cultivation of scientific temper, spirit of scientific enquiry, scientific attitude, scientific interest ,scientific awareness, scientific

outlook, disposition to reason logically, habit of judging beliefs and formation of opinions based on available evidences, readiness to reject unfounded theories and principles have been emphasized in science education.

And secondly, in the social perspective, science education has been aimed at equipping individuals to participate in the creation of a society which is free from poverty, hunger, diseases and such as evils , superstitions, blind belief, violence, exploitation, oppression, seclusion, isolation, rejection and so on. The whole curriculum in science has undergone a revolutionary change in the light of globalization and information revolution with the broader objectives of providing every student with optimum knowledge and skills regarding the physical and biological world around in order to enable him to take intelligent decisions to solve personal as well as environmental problems.

Nowadays, science educators realize that scientific interest plays a major role in the science enterprise and science teaching; unfortunately, very few researchers have focused on exploring student's scientific interest and improving or fostering student's interest in science learning. Therefore both theoretical and pedagogical significance has been pursued in the present study. Theoretically, this study attempts to determine the relation of scientific interest to the higher secondary students. The research results may help to determine the scientific interest among the students of different areas wise, gender wise and types of schools. Therefore scientific interest can be enhanced through various means in classroom science teaching. In this regard, this study is an attempt to analyze the scientific interest among the students of higher secondary students of rural and urban areas. It is important to conduct this study so as to find the possible reasons and problems relating to the interest towards this discipline and also to provide suitable solutions to the problems.

1.4 STATEMENT OF THE PROBLEM

The problem selected to the study is precisely stated as under:

"**A STUDY OF SCIENTIFIC INTEREST AMONG HIGHER SECONDARY SCHOOL STUDENTS OF JAMMU DISTRICT"**

1.5 OPERATIONAL DEFINITIONS OF THE KEY TERM USED

1) SCIENTIFIC INTEREST:

Interest refers to a preference for one activity over another. It is also defined as a combination of characteristics indicative of an individual's capacity to acquire some specific knowledge, skill or set of organized responses in science. When an individual voluntarily participates in activities related to science, a student's interest in science is manifested.

So in the present context 'Scientific interest' means "preference" for voluntary participation in science related activities". The term interest in science has a wider meaning. It extends from a mere positive feeling towards science to complete absorption in scientific inquiry. Interest has been interpreted as "Determinants of success, second in importance to intelligence" as measured by scientific interest inventory developed by Karuna Shankar Mishra.

2) **Higher secondary school students**:

The term 'higher secondary school students' means the students studying XI and XII standards in higher secondary schools. In this study, the term higher secondary students refer to the XII standard students studying science as one of their subjects.

3) **Gender**: In the present context, gender refers to boys and girls studying in higher secondary schools located in Jammu district.

4) **Types of schools**: In the present context, type of schools refers to the government and private higher secondary schools of Jammu district.

1.6 OBJECTIVES OF THE STUDY

1) To find out the significant difference in scientific interest among higher secondary school students with respect to gender (male and female).

2) To find out the significant difference in scientific interest among higher secondary school students with respect of type of school (government and private).

3. To find the significant difference in interactional effect of gender (boy and girl) and type of institutions (govt. and private) among higher secondary school students when scientific interest scores are taken as dependent variable.

1.7 HYPOTHESES OF THE STUDY

1. There is no significant difference in scientific interest among higher secondary school students with respect to gender (male and female).
2. There is no significant difference in scientific interest among higher secondary school students with respect of type of school (government and private).
3. There is no significant different in the interactional effect of gender (boy and girl) and type of institutions (govt. and private) among higher secondary school students when scientific interest scores are taken as dependent variable.

1.8 DELIMITATIONS OF THE STUDY

1 The present study was confined to Jammu district only.

2 The study was confined to higher secondary schools of Jammu district only.

3 The sample of the present investigation was confined to only 160 higher secondary school students studying in government and private schools.

4. Only 7 schools were included in the present study.

CHAPTER-2
REVIEW OF RELATED LITERATURE

CHAPTER- 2

REVIEW OF RELATED LITERATURE

A literature review is a written summary of general articles, books and other documents that describe the past and current state of information on the topic under investigation. Literature review is organised into subtopics and documents are need for a proposed study. In the most rigorous form research, educators base this review mainly on research reported in general articles. A review, however, might also contain other information drawn from conference papers, books and government documents. In composing literature review both quantitative and qualitative studies are cited.

Why is this review necessary? Many reasons exist. Researchers conduct a literature review to document how your study adds to the existing literature. A study will not add to the literature if it duplicates research already available literature review is the base for learning new ideas, sharing the latest findings with others for or identifying practices that might improve the educational system conducting a literature review also builds research skills of using the library. Reading the literature also helps to learn how other educators compose their research studies and helps to find useful examples and models in the literature for your own research. By conducting a literature search using computer data bases researcher develops skills in locating needed materials in a timely manner.

Although conducting a literature review follows no prescribed path, if researcher plans to design and conduct a study, typically has to go through five interrelated steps-

I. Identify key terms to use in your research for literature.

II. Locating literature about the topic by consulting several types of materials and databases.

III. Critically evaluate and select the literature for review.

IV. Organise the literature you have selected by abstracting or taking notes on the literature.

V. Write a literature review that reports summaries of the literature.

2.1 STUDIES IN INDIA

Mathai (2010) conducted a study on vocational interest, career maturity and interest in Commerce education of Commerce students at higher secondary level. The major findings of the study showed that there is a negative and non-significant relationship between vocational interest and interest in commerce for the total sample and in the case of demographic variables. Also the study gave the result that there is a negative and no significant relationship between career maturity and interest in commerce.

Gafoor & Narayan (2012) explored those experiences that significantly contribute to interest in science on a sample of upper primary school students from Kerala, India. The results of study revealed that biology related experiences and chemistry experiments influence interest in science in girls more than boys. The physics activity and biology experimentation influenced the interest in science among boys than girls. Urban school students showed enhanced interest in science over their rural counterparts.

Patel (2012) studied the scientific attitudes and interest of secondary school students of Ahmedabad district in relation to some variables. The results show that the level of significance in interest is found higher in girls than that of boys. Standard does not affect the science interest.

Soundararajan (2013) studied the science interests of higher secondary school students. The aim was to study the level of science interest of higher secondary school students. A sample of 300 higher secondary school students from four different schools in Dindigul district was selected using random sampling technique. The data was collected by using the science interest inventory constructed by N.O. Nellaiyappan (1994). The normative survey method was used for research. The collected data was subjected to‘t’ test and ‘F’ test for large independent groups. The result disclosed that there was a significant difference in the level of science interest between the urban and rural students and the type of management and there was no significant difference in the level of science interest between boys and girls.

Chandrasekaran (2014) conducted an experimental study to assess the development of four science related constructs namely, scientific interest, scientific attitude, critical thinking and creative intelligence in learning of biology. Students of the biology group of class IX belonging to higher secondary schools were randomly assigned to experimental and control groups. Both the groups were equated on the basis of their pretest scores. Control group was taught four chapters of biology by traditional approach whereas the experimental group received instructions by the synectics model of teaching for a period of twelve weeks. On analyzing the pretest and post test scores of the two groups it was concluded that the experimental group showed more development in their attitude, creative intelligence and critical thinking than the control group students. Thus it was generalized that the synectics model of teaching played an important role in the development of the creative intelligence and creative thinking of the students learning biology.

Deivamani& Rajasekar (2016) explored a study on higher secondary student's science interest. Normative survey method and random sampling technique was used in the selection of a sample of 1000 students and science interest inventory was constructed and validated by Nellaiyappan, N.O., (1994) was distributed among the students. The result disclosed that the higher secondary school students showed a high level of interest in science and the same trend was seen in respect of the sub-samples too.

Gomathi & Mohaideen (2016) studied interest of higher secondary students in chemistry & their scientific aptitude. A sample of 500 students was taken and simple random technique was adopted. The result revealed that the interest of students in this subject was found to be related with their scientific aptitude.

Sivaprakasam (2016) conducted a study on science interest and academic achievement among higher secondary biology students in relation to their mental health. The main objectives were to find out the level of science interest and achievement in biology and their mental health of higher secondary students. A sample consists of 400 higher secondary students. Normative survey method had been used. The tool of science interest inventory by Nellaiappan and mental health inventory by Peterbecker were used. The findings revealed that the

majority of higher secondary students have a high level of interest in science, achievement in biology and their mental health.

Yashu & Rai (2016) conducted a study of attitude towards scientific interest among the tribal students at secondary level in Kohima. A sample of 78 tribal students (39 from private and 39 from government secondary school students) was selected by stratified random sampling method and scientific attitude scale was used for data collection. The result revealed that tribal students of private secondary schools have more in relation to their scientific interest and curiosity in comparison to tribal students of government secondary schools.

Mohan & Karnan (2017) examined the relationship between scientific interest and thinking styles of high school students. A sample of 300 high school students was selected from different schools in Thiruvallur district by using stratified random sampling technique and adopted a survey method of research. Scientific interest inventory tool was used for data collection. The result disclosed that the level of scientific interest and thinking style of high school students was moderate in nature and there exists a positive relationship between scientific interest and thinking style of high school students.

Singh & Bai (2017) investigated a study of scientific interest of secondary school students in West Tripura district. A sample of 110 secondary school students were selected randomly from seven schools located in west Tripura and a descriptive survey method of research was used. The methodology includes' test. The result indicated that students studying in secondary schools hold an average level of science interest.

Jampannanavar & Yadawad (2018) investigated a relationship between scientific attitude and academic achievement in science among secondary school students. The main objectives were i) to study the relationship between scientific attitude and academic achievement of IX standard students as a whole. (ii) to study the relationship between scientific attitude and academic achievement of IX standard boys students. (iii) to study the relationship between scientific attitude and academic achievement of IX standard girls students. (iv) to study the relationship between scientific attitude and academic achievement of IX

standard rural students. (v) to study the relationship between scientific attitude and academic achievement of IX standard urban students. A sample of 400 students in Koppel district. Science Attitude Scale-developed by Avinash Grewal was used as a tool. Pearson's Product Moment (Correlation) was used. The findings revealed that(i)the relationship between scientific Attitude and Academic Achievement in science of IX Standard students as a whole is found to be significant and positive(ii) the relationship between Scientific Attitude and Academic Achievement in Science of IX standard Boys students is found to be significant and Positive.(iii)the relationship between Scientific Attitude and Academic Achievement in science of IX standard Girls students is found to be not significant and Positive.(iv). Relationship between Scientific Attitude and Academic Achievement in Science of IX standard rural school students is found to be significant and Positive. (v)Relationship between Scientific Attitude and Academic Achievement in Science of IX standard urban school students is found to be not significant and Positive.

Anuruba (2019)studied the levels of Higher Secondary students Achievement in Chemistry, levels of Scientific Aptitude, levels of Science Interest and their perception towards Learning Environment. This study was designed to investigate the Scientific Aptitude, Science Interest and Learning Environment in relation to Achievement in Chemistry among the Higher Secondary students in Pondicherry. By using Simple Random Sampling Technique, first year Higher Secondary students were selected and used as subjects in this study from Pondicherry region. The Normative Survey method has been used to collect the data. In order to measure the Scientific Aptitude, K.K. Agarwal Bareilly and Saroj Arora s Test Battery was adopted. Accordingly, the Science Interest test by L.N. Dubey and Archana Dubey were adopted for this study and the Learning Environment Scale by S. Rajasekar was adopted. The Achievement Test in Chemistry was constructed and standardized by the researcher and used as a tool in this study.

Ayishajuhi & Sreelatha (2019) investigated scientific interest and level of creativity among higher secondary students in Kanyakumari district. The objective of the study was to find out the level of scientific interest and level of

creativity among higher secondary students. The study also investigated the significant difference in scientific interest and level of creativity among higher secondary students with respect to the gender, locality of institution, medium of instruction, type of family, type of school and religion. The investigator used a normative survey method for investigation. Data was collected from a sample of 300 higher secondary students. The investigator used Scientific Interest Inventory (AyishaJuhi and Sreeletha, 2018) and Creativity test (Devishree and Sam Sandra Raj, 2009). The statistical techniques used were percentage analysis, t-test, ANOVA and Pearson Product moment (r). The findings revealed that the level of scientific interest and level of creativity among higher secondary students at moderate level. There was no significant difference in scientific interest and level of creativity among higher secondary students with respect to locality of school, medium of instruction, type of school and religion, but significant differences existed in the scientific interest and level of creativity among higher secondary students with respect to gender and type of family.

Kaur (2019) studied the Science interest of secondary school students of Ludhiana district. To achieve this objective, Science Interest Test by Dr. L. N. Dubey and Dr. Archna Dubey (2002) was used. The sample consisted of 100 secondary students who were taken randomly from the schools of Ludhiana District. The result revealed that there is no significant difference in Science interest of secondary school students of Ludhiana district.

Lalrinmawia & Fanai (2020) studied the level of science achievement among higher secondary school students and compared achievement between; male and female; government, deficit and private schools. This study was very important because, the first National Achievement Survey which was conducted by NCERT in 2015 reported that the average performance of class X students in the State was significantly lower than the National average in Science subject and stated that the need for improvement of 64.8 % in the said subject.. Achievement test in Science developed and standardized by Dr SC Gakhar and Dr Rajnish was employed and distributed to 298 students from the government, deficit and private schools. Primary and secondary data were analyzed by using SPSS Statistics for Windows, Version 17.0. Level of achievement in Science among

higher secondary students was very low, 95.64% fell below average level. No significant difference in Science achievement was found between female and male students. Moreover, there was no significant difference between government and private school students, but there existed a significant difference between deficit and government as well as deficit and private schools. Students from deficit school outperformed both government and private schools. The author suggested that science teachers should use collaborative learning activities and social modeling to promote students' interest, motivation, and achievement in science careers. Learner-centered teaching-learning methodologies such as activity-based learning and laboratory experiments in Science should be employed to build students' attitudes towards Science subjects.

2.2. STUDIES IN ABROAD

Kerger, Martin & Brunner (2011) examined how we can enhance a girl's interest in scientific topics? With the objective if scientific topics that are considered to be stereotypically feminine were chosen, however this might lead to increase in girl's interest in science. The hypothesis was empirically tested by means of two studies. A sample of 294 (study 1) and 190 (study 2) of grade 8 to grade 9 was taken. Gender differences in student's interest in masculine and feminine topics were investigated for a range of scientific concepts (study 1) as well as for a given scientific concept (study 2) for four scientific subjects (i.e. biology, physics, information technology & statistics). The result disclosed that the mean level of girl's scientific interest was higher when scientific concepts were presented in the context of feminine topics and boy's level of scientific interest was higher when scientific concepts were presented in the context of masculine.

Zeidan (2014) investigated the relationship between the Palestinian secondary school students' knowledge level of science process skills and their attitudes toward science, and the effect of gender and residence of these students on their knowledge level of science process skills and on their attitudes toward science. The study used an 18 - question science process skills test and a 25-item attitude toward science questionnaire. The association between knowledge level of science process skills and attitudes toward science were significant with a

correlation coefficient of 0.69. The results of the study indicated that there were significant differences in science process skills due to gender favouring females; and due to residence favouring villages' students. However, there were no significant differences in attitudes toward science due to the variables.

Hamelo (2016) explored interest of grade ten students toward physics among other science subjects, case of wolaita so do town governmental secondary schools, Ethiopia. A sample of 490 students was taken and adopted a survey method to collect the data. The result disclosed that the interest in students towards physics is low and students hate to learn physics in comparison with other science subjects.

Simon, et al. (2016) studied young science journalism writing popular scientific articles may contribute to an increase of high school student's interest in the natural sciences. With the objective to raise students' interests in the natural sciences by encouraging them to write popular scientific articles about self-chosen topics, and to help them improve their writing competence. A sample of grade 10 students of one Austrian high school, engaging both the biology and German teacher of the class. The result disclosed that by using a mixed method approach, it was found that almost all students valued the project related work highly and most of them showed higher interest in the natural sciences at project end with girls on average, seeming to profit more from project participation.

Cincera, et al (2017) examined what science is about- development of the scientific understanding of secondary school students. With the objective to analyse if an applied instructional strategy is successful in developing the student scientific understanding. A sample of 83 students (60 girls, 23 boys) of three grammar schools was taken. By using quasi-experimental non-equivalent control group design when both group received the same instruments in the same time span. It was discussed that it positively affects student's understanding of scientific principles and procedures.

Ajayi (2017) explored the effect of hands-on activity based methods on interest of senior secondary students in organic chemistry. A sample of 184 students from four purposely selected secondary schools from Makurdi Local

Government Area of Benue state , Nigeria was taken and a quasi-experimental design was adopted. The experimental group was taught organic chemistry using hands-on activity based methods while the control group was taught using discussion methods. A validated 25 item Organic Chemistry Interest Inventory (OCII) was the instrument used to collect the data. The result disclosed that students taught using hands-on activity-based had significantly higher mean interest scores than those taught using discussion methods.

Hsieh (2017) explored senior high school student's comprehension and interest in science content: examples of participating in first hand experimental activities. With the objective to examine whether students' understanding of science increases after exposure to scientific content with animation and provision of experience with practical scientific activities. Second, according to the Kolb scale an effort was made to determine which type of learning characteristics lead to higher degrees of understanding of science after engaging in practical scientific activities. Third, the study was used to investigate whether student willingness to engage in science related work in the future was correlated with their levels of understanding of science. A sample of 154 students from six senior high schools was selected. The result disclosed that most of the students exhibited significant improvement in their understanding of science after they were involved in actual experimental processes with animated content.

Shahali, et al. (2017) investigated STEM learning through engineering design: impact on middle secondary students' interest towards STEM. With the objective to investigate student's changes of interest towards STEM subjects and interest in pursuing a STEM career after participating in a non-formal integrated STEM education programme. A sample of 129 (in 2014) and 113 (in 2015) was taken. Quasi experimental design was used in the study. The result revealed that overall there was a significant increase in mean scores for interest towards STEM subjects & career after participating in the programme and also indicated that the program was effective at modifying student's interest level as result revealed positive changes for both 2014 and 2015 groups.

Jackson, et al. (2019) investigated talking about science interest: The importance of social recognition when students talk about their interest in STEM.

A sample of first semester freshmen undergraduate science students was taken and tested whether or not talking with close others about one's interests and receiving social recognition during those conversations, was related to having a greater science career interest over time. The result disclosed that the way in which students perceive others' reactions to their scientific interests during these conversations may have the greatest impact on students that face greater external barriers to persisting.

Toli and Kallery (2021) studied the students' learning by enhancing their interest in the concept of energy. Junior high school students' learning and interest is evaluated after engaging in activities on work and energy. The intervention integrated hands-on and simulated experiments included a structured series of guided investigative tasks and whole-class discussions. The intervention was delivered to an experimental group consisting of 110 junior high school students. The control group consisted of 96 students of the same grade level, where students were taught about energy in the traditional sense, i.e., via the standard textbook. Written tests were then handed to all students to assess their learning outcomes. The results showed that the learning outcomes of students in the experimental group were significantly better than those of students in the control group. A notable increase in interest from students in the experimental group compared to that of the control group was also observed. Findings also showed a significant positive correlation between interest and academic achievement. This study reconfirms that enhancing interest could lead to better learning outcomes and its evidence-based methodology can be equally applied when introducing students to other difficult concepts of science.

The above studies revealed that when the students are involved in an experimental process there is significant improvement in their understanding of science and this leads to the development of scientific interest among all the students. Scientific interest plays an important role among the students to know about all the facts related to science and develop cognitive skills among them, those are very helpful in every phase of life as well as the education field.

CHAPTER-3
METHODS AND PROCEDURE

CHAPTER- 3

METHODS AND PROCEDURE

Methodology has to be the most important aspect towards any study methods that are most important in a research process. They describe the various steps of the plan to be adopted in solving a research problem. Methodology used in any investigation in fact determines its testing. In research, there are numerous methods and procedures to be applied such as historical method, experimental method, survey method and case study method. Out of these methods the survey method was selected which was most appropriate to the project or problem under investigation. The present study aims to study the relationship between scientific interest and mental imagery among higher secondary school students. Once the problem has been selected & identified, the next step is the collection of data. The collection of data is of paramount importance in the conduct of research. The nature of data depends mostly upon the type of tool and technique used by researchers for collecting the data. It is necessary to adopt or evolve systematic procedures to collect essential data. Relevant data, adequate in quality and quantity should be collected.

Research design is the blueprint of the procedures that enables the researcher to test hypotheses by reaching valid conclusions about the relationship between dependent and independent variables. It is a plan, structure and strategy of research prepared to obtain answers to research questions and to control variance. Before doing the study the researcher has fixed the topic and area because it provides the entire draft of the scheme of research starting from writing a hypothesis there operational implications to the final analysis of the data. The structure of the research is more specific as it provides the outline, the scheme, the paradigm of the operation of the variables without a plan of the study no scientific study is possible.

Plan and procedure constitute a significant part of a research. A well thought out plan of action in advance, followed by a systematic execution brings fruitful results. Finally it also concludes determining the techniques how the data

will be analysed and conclusions reached at. The order of discussion of the procedure is as under-

1. Population
2. Selection of Sample
3. Variables Studied
4. Selection of tool
5. Administration of tool
6. Scoring of tool
7. Statistical techniques employed

3.1 POPULATION

The population of the study consisted of higher secondary school students of Jammu district and a representative sample from the population was selected by the investigator.

3.2 SELECTION OF SAMPLE

Sampling is the fundamental and basic vital essence of research. Sampling generally refers to the process of selecting a small part of specimen of something in order to determine some qualities or characteristics of the whole. It is very easy to understand the investigator can never collect the data about the whole population in any investigation. One has to selected group of individual who could present the whole population and form the basis for making reference for certain population facts. This is known as sampling. The sampling the sampling has great utility in research. The size of the sample varies form study, methods and nature of population. It is easier, less time consuming and economical to deal with a sample than the whole population. In fact good sample minimizes the error of estimation.

The sample of the present study consisted of 160 (80 boys and 80 girls) higher secondary school students studying in government and private schools selected by simple stratified sampling basis of Jammu district. The list of the schools and number of students selected for the present study are given in Table 3.1.

Table 3.1: Number of students selected from different schools.

S.no.	Name of the school	Boys	Girls	Total
1.	Govt. Girls Hr. Secondary School Mubarakh Mandi Jammu	0	15	15
2.	Govt. Boys Hr. Secondary School Sarwal Jammu	18	0	18
3.	Govt. Girls Hr. Secondary School Nowabad Jammu	0	25	25
4.	Govt. Sri Ranbir Hr. Secondary School Jammu	22	0	22
	Oriental Academy Senior Secondary School Jammu	16	19	35
5	Dewan Badri Nath Hr. Secondary School Jammu	10	10	20
6	Shri Mahavir Jain Hr. Secondary School Jammu	14	11	25
	Total	**80**	**80**	**160**

3.3 VARIABLES STUDIED

In the present study there are two independent variables and one dependent variable which are to be studied :-

Independent Variables :-

Gender : Male and Female

Type of Institutions : Government and Private

Dependent Variable :-

Scientific Interest Inventory Scores

3.4 SELECTION OF TOOL

For collecting the required data for the study one might use various devices or instruments. The instruments thus implied for collection of data are called tools.

Keeping in view the objectives of the study following tools has been used:

Scientific interest inventory:

In the present study researcher employed or used a scientific interest inventory (SII) developed by Karuna Shankar Misra (1971). In order to quantify

the scientific interest of higher secondary school students. The scientific interest inventory is five point scales in which the respondents are asked to give three responses for 49 items. They were requested to select the appropriate answer for each question from the given five choices that are very much, much, normal, less and very less.

The scientific interest inventory has been appended to Appendix A.

Reliability: Test-retest was found to be .652 for a sample of 50 students studying in class IX of two schools.

Validity: Validity of the inventory was calculated against 'scientific interest inventory' developed by Vijay Kumar (2003). It was found to be .8387, which is significant at .01 level of significance.

3.5 ADMINISTRATION OF TOOL

After deciding the sample and tools to be used the next step was how to administer the tool to collect the desired data from higher secondary school students. The investigator first took the permission from the head of the institution and personally visited the schools for collection of data. Personal presence of the investigator would satisfy the curiosity of the students and also the purpose of the study could be explained to the students in order to ensure reliable responses copies of scientific interest inventory questionnaires were supplied to the students simultaneously. After supplying the copies/tools, each student was asked to tick one of the five possibilities of scientific interest.

3.6 SCORING OF TOOL

Scoring of responses in the Scientific Interest Inventory

Very much	5
Much	4
Normal	3
Less	2
Very less	1

The scores of each respondent were calculated by adding the score values of responses given against the statement in the scale.

3.7 SELECTION OF STATISTICAL TECHNIQUE

In the present investigation, the investigator employed the following statistical techniques: -

In the present study, the statistical technique Two-way Analysis of variance with 2x2 factorial design was applied in order to study the scientific interest of higher secondary school students belonging to different gender and type of Institutions.

CHAPTER-4
ANALYSIS AND INTERPRETATION OF DATA

CHAPTER – 4

ANALYSIS AND INTERPRETATION OF DATA

The most important step in any research project is the organization, analysis and interpretation of data. Analysis of data means studying the tabulated material in order to determine inherent facts or meanings. Collection of data has no meaning unless it is tabulated properly, analyzed and interpreted by sophisticated statistical techniques. A systematic and scientific treatment of the tabulated data is essential for drawing valid conclusions. It involves the breaking down of the complex factors into simpler parts and putting these parts together in new arrangements for the purpose of interpretation. It requires an alert, flexible and open mind. The interpretation of data helps the investigator to analyze the same problem or the related problem with appropriate statistical techniques without using their labour.

The data may be adequate valid and reliable to any extent, it does not serve any worthwhile purpose unless it is carefully edited, systematically classified and tabulated, scientifically analyzed, intelligently interpreted and rationally concluded. After the collection of data, it may be analyzed properly so as to draw proper inferences.

The purpose of interpretation is essentially to know-what do the results show ? What do they mean? What is their significance etc. so the interpretation is considered to be the most important step in the total procedure of research ?

4.1 ASSUMPTIONS OF ANALYSIS OF VARIANCE

ANOVA is a powerful statistical technique or tool used to test the homogeneity of several means. It was developed by R.A. Fisher, an English Statistician in 1920's who is also considered the father of modern statistics, it is an economical method of testing significant difference between the means of two groups.

It is simplest form that is used to test the significance of the differences between two or more groups. According to Fisher, "ANOVA is the separation of variance ascribable to our group of causes from variance ascribable to other groups."

Following are the important assumptions of ANOVA : -

1. The selection of the cases for each set should be based on random sampling method.
2. The variance within sets should be equal otherwise the effect of treatments would not be clearly visible.
3. The calculations of the variance in the total sample must be additive i.e. Sum of square should never appear with negative sign.
4. The observations in this experimentally homogenous sets should be from normally distributed population.

4.2 ADVANTAGES OF ANALYSIS OF VARIANCE

Following are the advantages of ANOVA :-

1. ANOVA helps to compare all the groups or any number of comparisons in a simple test.
2. It is time saving and also involves less risk of errors i.e. when we reject the null hypothesis at small variance to be significant at 0.05 level.
3. The result obtained through analysis of variance are understandable and interpretable.
4. It is a powerful statistical technique for testing significance of mean difference between more than two groups which have been exposed to different experimental treatments. It is an overall test of significance.
5. The analysis of variance is useful when there are more than two groups to be compared for testing significance of mean difference. Hence it also permits extension of one way classification to multiple factorial designs involving many factors at one time.

6. The use of ANOVA facilities to study the joint influence of a number of facts technically known as interactions. The interactions may be between two to any number of variables.

4.3 SELECTION OF STATISTICAL TECHNIQUE OF ANALYSIS

In the present study, there are two independent variables i.e. gender and type of school and one dependent variable i.e. scientific interest. The investigator applied two-way ANOVA with 2x2 factorial design. gender is varied into two ways i.e. boy and girls and type of school are varied into two ways i.e. Govt. and private school. Thus four cells were formed the help of ANOVA test.

4.4 ANALYSIS OF VARIANCE

In the present study, the two – way analysis of variance technique is applied to the data of scientific interest scores with the factorial design as 2x2 factorial matrices with scientific interest among higher secondary school students belonging to govt. and private criterion, which was studied in relation to different type of school and gender (Male and Female).

4.5 GENERAL COMPUTATIONAL STEPS FOR COMPUTATION OF TWO WAY ANOVA

Following are the general computational steps employed in two way ANOVA

Step I. Correction or C = $\frac{(\Sigma X_T)^2}{N_T}$

Step II. Sum of squares for total (SS_T)

$$SS_T = \Sigma X^2_T - C$$

Step III. Sum of squares for A (SS_A)

$$SS_A = \frac{(\Sigma A_1)^2}{NA_1} + \frac{(\Sigma A_2)^2}{NA_2} - C$$

Step IV. Sum of squares for B (SS_B)

$$SS_B = \frac{(\Sigma B_1)^2}{NB_1} + \frac{(\Sigma B_2)^2}{NB_2} - C$$

Step V. Sum of squares for Between cells ($SS_{Bet.\ cells}$)

$$SS_{Bet.cells} = \frac{(\Sigma A_1 B_1)^2}{N_1} + \frac{(\Sigma A_1 B_2)^2}{N_2} + \frac{(\Sigma A_2 B_1)^2}{N_3} + \frac{(\Sigma A_2 B_2)^2}{N_4} - C$$

Step VI. Sum of squares for Interaction (SS_{AxB})

$$SS_{AxB} = SS_{Bet} - (SS_A + SS_B)$$

Step VII. Sum of squares for within (SS_W)

$$SS_W = SS_T - SS_{Bet.\ cells}$$

Summary of two – way ANOVA

Sources of variance	SS	DF	MS	F	Level of Significance
A (Columns)					
B (Rows)					
AxB (Columns & Rows)					
Within					

COMPUTATION OF TWO WAY ANOVA

In this study, the researcher was interested to study the differences in scientific interest among higher secondary school students belonging to different gender (boys and girls) and type of institution i.e. govt. and private.

Table 4.1 Showing scores of scientific interest in relation to gender and type of institutions

		GENDER		
		Male (A_1)	**Female (A_2)**	
Type of Institutions	**(B_1) Govt.**	131 178 142 166 177 175 153 141 184 166	131 182 188 167 147 184 160 178 169 140	
		$\Sigma A_1B_1 = 1613$ $N_1 = 10$	$\Sigma A_2B_1 = 1646$ $N_3 = 10$	$\Sigma B_1 = 3259$ $NB_1 = 20$
	(B_2) Private	178 174 178 157 148 163 176 165 182 130	171 170 162 181 151 151 140 169 178 163	
		$\Sigma A_1B_2 = 1651$ $N_2 = 10$	$\Sigma A_2B_2 = 1636$ $N_4 = 10$	$\Sigma B_2 = 3287$ $NB_2 = 20$
		$\Sigma A_1 = 3264$ $NA_1 = 20$	$\Sigma A_2 = 3282$ $NA_2 = 20$	$\Sigma X_T = 6546$ $N_T = 40$

Table 4.2 Showing squares of the scores.

Type of Institutions	**GENDER**		
	Male (A_1)	**Female (A_2)**	
(B_1) Govt.	17161 31684 20164 27556 31329 30625 23409 19881 33856 27556	17161 33124 35344 27889 21609 33856 25600 31684 28561 19600	
	$\Sigma A_1B_1^2 = 263221$ $N_1 = 10$	$\Sigma A_1B_1^2 = 274428$ $N_2 = 10$	$\Sigma B_1 = 537649$ $NB_1=20$
(B_2) Govt.	31684 30276 31684 24649 21904 26569 30976 27225 33124 16900	29241 28900 26244 32761 22801 22801 19600 28561 31684 26569	
	$\Sigma A_1B_2^2 = 274991$ $N_3 = 10$	$\Sigma A_2B_2^2 = 269162$ $N_4 = 10$	$\Sigma B_1^2 = 544153$ $NB_1^2=20$
	$\Sigma A_1^2 = 538212$	$\Sigma A_1^2 = 543590$	$\Sigma X_T^2 = 1081802$ $N_T = 40$

Step I. Correction or $C = \frac{(\Sigma X_T)^2}{N_T}$

$= \frac{(6546)^2}{40}$

$= \frac{112850116}{40}$

$= 1071252.9$

Step II. Sum of squares for Total (SS_T)

$SS_T = \Sigma X^2 - \frac{(\Sigma X_T)^2}{N_T}$ or C

$SS_T = 538212 + 543590 - 1071252.9$

$= 1081802 - 1071252.9 = 10549.1$

$SS_T = 10549.1$

Step III. Sum of squares for A (SS_A)

$SS_A = \frac{(\Sigma A_1)^2}{NA_1} + \frac{(\Sigma A_2)^2}{NA_2} - C$

$= \frac{(3264)^2}{20} + \frac{(3282)^2}{20} - C$

$= \frac{10653696}{20} + \frac{10771524}{20} - C$

$= 532684.8 - 538576.2 - 1071252.9$

$= 1071261 - 1071252.9$

$SS_A = 8.1$

Step IV. Sum of squares for B(SS_B)

$SS_B = \frac{(\Sigma B_1)^2}{NB_1} + \frac{(\Sigma B_2)^2}{NB_2} - C$

$= \frac{(3259)^2}{20} + \frac{(3287)^2}{20} - C$

$$= \frac{10621081}{20} + \frac{10804369}{20} - C$$

$$= 531054.05 + 540218.45 - C$$

$$= 1071272.5 - 1071252.9$$

$SS_B = 19.6$

Step V. Sum of squares for Between cells ($SS_{Bet.}$)

$$SS_{Bet.cells} = \frac{(\Sigma A_1 B_1)^2}{N_1} + \frac{(\Sigma A_1 B_2)^2}{N_2} + \frac{(\Sigma A_2 B_1)^2}{N_3} + \frac{(\Sigma A_2 B_2)^2}{N_4} - C$$

$$= \frac{(1613)^2}{10} + \frac{(1646)^2}{10} + \frac{(1651)^2}{10} + \frac{(1636)^2}{10} - C$$

$$= \frac{2601769}{10} + \frac{2709316}{10} + \frac{2725801}{10} + \frac{2676496}{10} - C$$

$$= \frac{10713382}{10} - 1071252.9$$

$$= 1071338.2 - 1071252.9$$

$SS_{Bet.. cells} = 85.3$

Step VI. Sum of squares for interaction (SS_{AxB})

$SS_{AxB} = SS_{Bet.cells} - (SS_A + SS_B)$

$= 85.3 - (8.1 + 19.60)$

$= 634.1 - 585.8$

$= 85.3 - 27.7$

$SS_{AxB} = 57.6$

Step VII. Sum of square for within (SS_W)

$SS_W = SS_T - SS_{Bet.cells}$

$= 10549.1 - 85.3$

$= 10463.8$

Table 4.3 : Showing the summary of two way ANOVA for 2x2 factorial design

Source of variance	SS	Df	MS	F – ratio	Level of Significance
A (Gender)	8.1	1	8.1	0.028	Not significant
B (Type of Institutions)	19.60	1	19.60	0.067	Not significant
AxB(Gender X Type of Institutions)	57.6	1	57.6	0.20	Not significant
Within	10463.8	36	290.67		

Interpretation

The F-ratio for A (Gender i.e. male and female) has been found to be 0.028 is less than the table value of 4.11 at 0.05 level of significance and 7.39 at 0.01 level of significance against 1 & 36 degree of freedom (df). So the calculated value is not significant. It means there is no difference in scientific interest of higher secondary schools students on the basis of gender (male & female). Hence the null – hypothesis stating there will be no significant difference in scientific interest of higher secondary schools male and female students accepted.

The F-ratio for B (Type of Institutions i.e. govt. and private) has been found to be 0.067 which is less than the table value of 4.11 at 0.05 level of significance and 7.39 at 0.01 level of significance against 1 and 36 df. So the calculated value is not significant. It means there is no difference in scientific interest of higher secondary schools students in belonging different type of to institutions (govt. & private).

The F-ratio for interaction (AxB) i.e. gender and type of institutions has been found to be 0.24 which is less than the table value of 4.11 at 0.05 level of significance and 7.39 at .01 level of significance against df 1 & 36. So the calculated value is not significant. It means there is no significant interactional effect of gender and type of institutions on scientific interest of higher secondary schools students. Hence null hypothesis stating there is no interactional effect of

gender and type of institutions in relation to scientific interest of higher secondary schools students is accepted.

CHAPTER-5
CONCLUSIONS, EDUCATIONAL IMPLICATIONS AND SUGGESTIONS

CHAPTER – 5

CONCLUSIONS, EDUCATIONAL IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 CONCLUSIONS

In the light of analysis and interpretation of the data as given in the precious chapters the investigator arrived at the following conclusions:

1. There is no significant difference in the scientific interest among higher secondary school students belonging to different gender (male and female).

2. No significant difference in the scientific interest among higher secondary school students belonging to different type of institutions (govt. and private).

3. There is no significant difference in the scientific interest among higher secondary school students on the interactional effect of gender (male and female) and type of institutions (govt. and private).

5.2 EDUCATIONAL IMPLICATIONS

On the basis of findings and conclusions following are the implications of the present Study:

1) Implications for Curriculum Developers

In science text books, at the end of a chapter there must be some open ended questions to facilitate the diversification of students' thinking. The presentation of content, rather than being in heavily texted mode, should be enriched with what, why and how aspects related to it. There should be sufficient number of practical's, experiments, activities pertaining to a particular concept. This study is helpful for the curriculum developers and policy makers. The policy makers take

desirable reformatories step to strengthen proper institutional climate and the practices being adopted in the schools.

2) Implications for school institutions

The study is also useful for the future of students because colleges are giving them knowledge, education and also guidance them for their future life. Colleges should organize various field trips, excursions, and exhibitions etc. for the students

3) Implications for teachers

Teachers also play an important role in students' life. In a classroom as well laboratory, process approach rather than product approach should be practiced as it motivates the students to respond what, why and how of a phenomenon under consideration. Classroom teaching practices with focus on attempts in developing scientific attitude among students prove instrumental enough in leading to desired learning (Moore & Foy, 1997) so, teachers should not intimate the students the result(s) of some activity or practical in advance but should stimulate the students to find it at their own end.

4) Implications for Parents

Parents should pay proper attention to their children they should guide or counsel their children. Family as an informal agency of education and parents as first teacher of a child should encourage, since beginning, him/ her to think rationally and discourage the habit of accepting the things as such. Rather than waiting for the institutions to organize field trips to science centre, zoo or any other extended learning resource the parents, if feasible, should take initiatives at their end. They should ask the child about his/her experience of the same and discuss.

5) Implications for students

Scientific attitude, scientific method etc. are applicable in almost all domains of interactions. All academic disciplines pave the ways to a learner to practice scientific method and adopt scientific attitude but science, as a discipline in comparison to others, offers somewhat more space for the same. In science

classroom, teachers should have concern with students in facilitating them in developing scientific attitude and students should participate in the learning process by questioning, self-questioning, cross questioning, reflecting at their own explanations. In the laboratory, students should not merely copy each other's data but verify the same by adopting hands-on-approach while doing practical's, experiments or activities. Over the time, such practices may facilitate the students to develop scientific attitude and score better in science.

5.3 SUGGESTIONS FOR FURTHER RESEARCH

The following suggestions are put forth by the investigator which can be taken up for further exploration.

1. The present study cannot be called comprehensive as more work can be done on different samples of different age group.

2. The study was confined only to the sample of 160 students. Hence, it is suggested that some type of further investigation can be made to know some more new areas it left untouched.

3. The present study was limited to 7 schools and it is suggested that colleges and university students can be taken for study also.

4. Since the present study was conducted in Jammu district only. Same study can be conducted in other district of J&K state.

SUMMARY

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Supervisor
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Associate Professor

Investigator
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M.Ed. Student

TOPIC: A STUDY OF SCIENTIFIC INTEREST AMONG HIGHER SECONDARY SCHOOL STUDENTS

A) INTRODUCTION

Education is one of the most important factors in achieving the national goals of a country. In the present age of Science and Technology, it has been increasingly realized that one needs to be educated not only to become a better man and better social being, but he should also be a better creative and productive being. Education is a social concept, philosophically evolved, psychologically developed and socially based."The whole of education, intellectual, moral and physical consisted in leading out the innate knowledge, virtues and powers of the child making the potential, actual".

In this modern world dominated by science and technology, science teaching must be effective and innovative, and beneficial to pupils Education is a systematic process through which a child or an adult acquires knowledge, experience, skill and sound attitude. It makes an individual civilised, refined, cultured and educated. Every society has to give importance to education because it is a panacea for all evils and key to solve the various problems of life. An educated person is socially conscious, morally upright, culturally distinct and yet nationally integrated. Education is a unique feature that plays the most dominant role in the life and evaluation of mankind. Hence education at all levels namely- Primary, Middle, Secondary, Higher secondary and Higher education plays an important role in shaping, sharpening and refining personality of the person.

Education is important to all living beings and it should be provided to all individuals for their all-around development. The strength of a nation depends upon how well educated its citizens are. Education has occupied a supreme place of special importance, because it moulds the personality of our children who are the future citizens of our nation. Education enables an individual to use his potentiality to the maximum extent. Education modifies the behavior of the younger generation, in a desired direction. In this regard school plays a significant role. School is an important, primary unit of society because it has a crucial responsibility of preparing the prospective citizens of the nation.

This indeed has been rightly expressed in Kothari Education Commission's report (1964- 1966) that "The destiny of our nation is shaped in her classrooms" In Rig-Veda, Education has been defined as that which makes man self-reliant and selfless. According to Swami Vivekananda Education is not the amount of information that is put into one's brain, rather it should be life building and man making character. He also emphasized that "Education is the manifestation of perfection which is already in man". As stated in the University Education Commission's report, Education according to Indian traditions is not merely a means of earning a living or it is a nursery of earning a living thought or school for citizenship. It is the imitation into the life of spirit, training of human souls in the pursuit of truth and practice of virtue. It is the second birth "Divityam Janma".

Science has revolutionized every sphere of life and has undoubtedly done a great service to mankind. Science is included in the school curriculum, to develop properly the power of thinking, reasoning, curiosity, open-mindedness and ultimately to develop scientific attitudes which may create the future scientists of the emerging world whom we are eagerly looking for our progress. Scientific-Interest improves a pupil's self-esteem, motivation and achievement. The pupils, who are encouraged to think creatively and independently, become more interested in discovering things for themselves, more open to new ideas, work and explore ideas. Scientific creativity, scientific attitude and scientific interest prepare pupils for life; the pupils who are creative will be prepared for a rapidly changing world, where they may have to adapt to several careers in life time. Scientific creativity, scientific attitude and scientific interest are central to the

way society functions in an obvious way through science, technology and myriad other manifestations. It is very essential to help the young talents to develop their innate desire to be creative and to shape their personality. Hence there is a need to guide and develop the younger individuals in relation to their scientific creativity, scientific interest and academic achievement.

An interest is a subjective attitude motivating a person to perform a certain task. It affords pleasure and satisfaction. It results in curiosity towards the object of interest, enthusiasm to be attached to the object, strength of will to face difficulties while engaged in the task of one's interest, a definite change in behavior in the presence of the object characterized by attention and concentration.

Interest is a feeling of likening associated with a reaction, either actual or imagined to a specific thing or situation. Interest is a tendency to become absorbed in an experience and to continue it, while an aversion is a tendency to turn away from it to something else. Hence, Science learning provides training in scientific method and helps to develop a scientific interest in the learners. Therefore, science is now a compulsory subject in every system of school education right from the elementary level. There is a highly significant and positive association among scientific interest and achievement of higher secondary school students. Therefore the science educators are required to promote the development of scientific attitude and scientific interest among the secondary school students. If necessary steps are taken the higher secondary school students will accomplish and achieve definite success in science education.

B) CONCEPT OF SCIENTIFIC INTEREST

In the dictionary of Education (1959) scientific interest is defined as a pronounced innate capacity ability in a given line of endeavors such as a particular art, school subject or vocation. Thus scientific interest refers to an individual's inborn capacities or potentialities which are indicative of some special abilities.

Freeman (1965) has defined an interest as a combination of characteristics indicative of an individual's capacity to acquire some specific knowledge skill or

set or organized responses such as ability to speak language to do mechanical work. These interests refer to an individual inborn capacity to acquire proficiency in a given area of human endeavours.

Scientific interest is a complex of interacting hereditary and environmental determinants producing predispositions / abilities that we can identify to an extent certain not all characteristics possessed by individuals who succeed late in scientific endeavours. Teaching is more than the presentation of facts.

Teaching is the development of new ways of thinking, a development that reveals itself in increased skills with the problems of life in new habits of actions in more desirable attitude and aptitudes in benefiting personality and is an improved character. Science can justify its place in the curriculum only when it prejudices important changes in young pupils, change their ways of thinking in their habits of action and in the values they assign to what they have and what they do.

C) IMPORTANCE OF SCIENTIFIC INTEREST

Nowadays, science educators realize that scientific interest plays a major role in the science enterprise and science teaching; unfortunately, few researchers have focused on exploring student's scientific creativity and improving or fostering student's creativity in science learning. Therefore both theoretical and pedagogical significance has been pursued in the present study. Theoretically, this study attempts to determine scientific interest among higher secondary students. The research results may help to determine the significant predictors of scientific interest and eventually find more appropriate ways to evaluate student's scientific interest.

If the findings of this study show a strong relation of scientific interest and some of the variables, science teachers may view scientific interest as an ability that can be taught rather than an innate, insightful, or fantastic ability. The research results will help teachers understand better which factors may affect student's scientific interest most. Therefore scientific interest can be enhanced through various means in classroom science teaching.

D) SIGNIFICANCE OF THE STUDY

The present research study has been taken to find out the scientific interest among the higher secondary students with respect to types of school, gender and area. Science has now become a compulsory subject in the school curriculum. Because of its multifarious value to the individuals as well as to the society. Science is a process of developing and cultivating the various powers, such as, mind, physical, mental and moral. Science is a fundamental right. So children develop interest in science. Science teaching by science educators and teachers is alike. The term "Interest in Science" has been employed to denote a range of meaning that extends from positive feeling towards science, to complete absorption is scientific inquiry. Science interest is highly valued in all human societies. If education is to prepare children for a productive life in society, the educational system must accept responsibility for developing science interest.

Science has become an integral part of our life and living. In the present context we cannot think of a world without science. The wonderful achievements of science have glorified the modern world and transformed the modern civilization into a scientific civilization. It is a way of penetrating into unexplored and unmastered realms. The present generation rests on the firm foundation laid down by the scientists with their valuable contributions. Science is a way of knowing and thinking about the natural and physical world. Science covers the broad field of knowledge that deals with observed facts and the relationship among those facts. Observing, measuring, inferring, classifying, predicting, and communicating are some of the skills fundamental to science. They are not only integral to science investigations, solving problems, and making decisions; but also they continue to science as a body of knowledge and a way of thinking and interest is meant "any aim or object which stimulates activity towards its attainment". It refers to certain regularities of an individual's feelings, thoughts and predispositions to act towards some aspects of his/her environment.

Hence scientific interest is concerned with interest in conducting scientific activities for seeking accurate knowledge to conduct experiments to implement new ideas. It is concerned with the involvement of teachers in scientific activities. Disposition to engage in activities that are appropriate to some definite object or act. Hence it is also defined as a combination of characteristics

indicative of an individual's capacity to acquire some specific knowledge, skill or set of organized responses in science. Science has brought about revolutionary changes in every walk of our life. Its impact is visible everywhere and in every aspect of our existence that is manifested in terms of vocational, social, economic, political, and cultural dimensions. Therefore in every country special attention is being given for the development of science. Science therefore occupies a very important place in curriculum both at school and university stages of education in India.

Science education is supposed to perform two fold tasks. Firstly, in individual perspective the cultivation of scientific temper, spirit of scientific enquiry, scientific attitude, scientific interest ,scientific awareness, scientific outlook, disposition to reason logically, habit of judging beliefs and formation of opinions based on available evidences, readiness to reject unfounded theories and principles have been emphasized in science education.

And secondly, in the social perspective, science education has been aimed at equipping individuals to participate in the creation of a society which is free from poverty, hunger, diseases and such as evils , superstitions, blind belief, violence, exploitation, oppression, seclusion, isolation, rejection and so on. The whole curriculum in science has undergone a revolutionary change in the light of globalization and information revolution with the broader objectives of providing every student with optimum knowledge and skills regarding the physical and biological world around in order to enable him to take intelligent decisions to solve personal as well as environmental problems.

Nowadays, science educators realize that scientific interest plays a major role in the science enterprise and science teaching; unfortunately, very few researchers have focused on exploring student's scientific interest and improving or fostering student's interest in science learning. Therefore both theoretical and pedagogical significance has been pursued in the present study. Theoretically, this study attempts to determine the relation of scientific interest to the higher secondary students. The research results may help to determine the scientific interest among the students of different areas wise, gender wise and types of schools. Therefore scientific interest can be enhanced through various means in classroom science teaching. In this regard, this study is an attempt to analyze the

scientific interest among the students of higher secondary students of rural and urban areas. It is important to conduct this study so as to find the possible reasons and problems relating to the interest towards this discipline and also to provide suitable solutions to the problems.

E) STATEMENT OF THE PROBLEM

The problem selected to the study is precisely stated as under:

"**A STUDY OF SCIENTIFIC INTEREST AMONG HIGHER SECONDARY SCHOOL STUDENTS OF JAMMU DISTRICT"**

F) OPERATIONAL DEFINITIONS

SCIENTIFIC INTEREST:

Interest refers to a preference for one activity over another. It is also defined as a combination of characteristics indicative of an individual's capacity to acquire some specific knowledge, skill or set of organized responses in science. When an individual voluntarily participates in activities related to science, a student's interest in science is manifested.

So in the present context 'Scientific interest' means "preference" for voluntary participation in science related activities". The term interest in science has a wider meaning. It extends from a mere positive feeling towards science to complete absorption in scientific inquiry. Interest has been interpreted as "Determinants of success, second in importance to intelligence" as measured by scientific interest inventory developed by Karuna Shankar Mishra.

Higher secondary school students:

The term 'higher secondary school students' means the students studying XI and XII standards in higher secondary schools. In this study, the term higher secondary students refer to the XII standard students studying science as one of their subjects.

Gender: In the present context, gender refers to boys and girls studying in higher secondary schools located in Jammu district.

Types of schools : In the present context, type of schools refers to the government and private higher secondary schools of Jammu district.

G) OBJECTIVES OF THE STUDY

1) To find out the significant difference in scientific interest among higher secondary school students with respect to gender (male and female).

2) To find out the significant difference in scientific interest among higher secondary school students with respect of type of school (government and private).

3. To find the significant difference in interactional effect of gender (boy and girl) and type of institutions (govt. and private) among higher secondary school students when scientific interest scores are taken as dependent variable.

H) HYPOTHESES OF THE STUDY

1. There is no significant difference in scientific interest among higher secondary school students with respect to gender (male and female).

2. There is no significant difference in scientific interest among higher secondary school students with respect of type of school (government and private).

3. There is no significant different in the interactional effect of gender (boy and girl) and type of institutions (govt. and private) among higher secondary school students when scientific interest scores are taken as dependent variable.

I) DELIMITATIONS OF THE STUDY

1 The present study was confined to Jammu district only.

2 The study was confined to higher secondary schools of Jammu district only.

3 The sample of the present investigation was confined to only 160 higher secondary school students studying in government and private schools.

4. Only 7 schools were included in the present study.

J) POPULATION

The population of the study consisted of higher secondary school students of Jammu district and a representative sample from the population was selected by the investigator.

K) SELECTION OF SAMPLE

Sampling is fundamental to all the statistical methodology of research. Sampling refers to the process of selecting a small back of something in order to determine some quality of the whole. There are many techniques for obtaining a sample which may be representative of the whole population. The sample of the present study consisted of 160 higher secondary school students studying in government and private schools selected tool simple stratified sampling basis of Jammu district. The list of the schools and number of students selected for the present study are given in Table .1.

Table 1: Number of students selected from different schools.

S.no.	Name of the school	Boys	Girls	Total
1.	Govt. Girls Hr. Secondary School Mubarakh Mandi Jammu	0	15	15
2.	Govt. Boys Hr. Secondary School Sarwal Jammu	18	0	18
3.	Govt. Girls Hr. Secondary School Nowabad Jammu	0	25	25
4.	Govt. Sri Ranbir Hr. Secondary School Jammu	22	0	22
	Oriental Academy Senior Secondary School Jammu	16	19	35
5	Dewan Badri Nath Hr. Secondary School Jammu	10	10	20
6	Shri Mahavir Jain Hr. Secondary School Jammu	14	11	25
	Total	**80**	**80**	**160**

L) VARIABLES STUDIED

The following variables were studied in the present study:

Independent Variables :-

Gender : Male and Female

Type of Institutions : Government and Private Higher Secondary Schools

Dependent Variable :-

Scientific Interest Inventory Scores

M) SELECTION OF TOOL

For collecting the required data for the study one might use various devices or instruments. The instruments thus implied for collection of data are called tools.

Keeping in view the objectives of the study following tools has been used:

Scientific interest inventory:

In the present study researcher employed or used a scientific interest inventory (SII) developed by Karuna Shankar Misra (1971). In order to quantify the scientific interest of higher secondary school students. The scientific interest inventory is five point scales in which the respondents are asked to give three responses for 49 items. They were requested to select the appropriate answer for each question from the given five choices that are very much, much, normal, less and very less.

The scientific interest inventory has been appended to Appendix A.

Reliability: Test-retest was found to be .652 for a sample of 50 students studying in class IX of two schools.

Validity: Validity of the inventory was calculated against 'scientific interest inventory' developed by Vijay Kumar (2003). It was found to be .8387, which is significant at .01 level of significance.

N) ADMINISTRATION OF TOOL

After deciding the sample and tools to be used the next step was how to administer the tool to collect the desired data from higher secondary school students. The investigator first took the permission from the head of the institution and personally visited the schools for collection of data. Personal presence of the investigator would satisfy the curiosity of the students and also the purpose of the study could be explained to the students in order to ensure reliable responses copies of scientific interest inventory questionnaires were supplied to the students simultaneously. After supplying the copies/tools, each student was asked to tick one of the five possibilities of scientific interest.

O) SCORING OF TOOL

Scoring of responses in the Scientific Interest Inventory

Very much	5
Much	4
Normal	3
Less	2
Very less	1

The scores of each respondent were calculated by adding the score values of responses given against the statement in the scale.

P) SELECTION OF STATISTICAL TECHNIQUE

In the present investigation, the investigator employed the following statistical techniques: -

Two-way Analysis of variance with 2x2 factorial design was applied in order to study the scientific interest of higher secondary school students belonging to different gender and type of Institutions.

Q) ANALYSIS AND INTERPRETATION OF DATA

Table A : Showing the summary of two way ANOVA for 2x2 factorial design

Source of variance	**SS**	**Df**	**MS**	**F – ratio**	**Level of Significance**
A (Gender)	8.1	1	8.1	0.028	Not significant
B (Type of Institutions)	19.60	1	19.60	0.067	Not significant
AxB(Gender X Type of Institutions)	57.6	1	57.6	0.20	Not significant
Within	10463.8	36	290.67		

Interpretation

The F-ratio for A (Gender i.e. male and female) has been found to be 0.028 is less than the table value of 4.11 at 0.05 level of significance and 7.39 at 0.01 level of significance against 1 & 36 degree of freedom (df). So the calculated value is not significant. It means there is no difference in scientific interest of higher secondary schools students on the basis of gender (male & female). Hence the null – hypothesis stating there will be no significant difference in scientific interest of higher secondary schools male and female students accepted.

The F-ratio for B (Type of Institutions i.e. govt. and private) has been found to be 0.067 which is less than the table value of 4.11 at 0.05 level of significance and 7.39 at 0.01 level of significance against 1 and 36 df. So the calculated value is not significant. It means there is no difference in scientific interest of higher secondary schools students in belonging different type of to institutions (govt. & private).

The F-ratio for interaction (AxB) i.e. gender and type of institutions has been found to be 0.24 which is less than the table value of 4.11 at 0.05 level of significance and 7.39 at .01 level of significance against df 1 & 36. So the calculated value is not significant. It means there is no significant interactional effect of gender and type of institutions on scientific interest of higher secondary schools students. Hence null hypothesis stating there is no interactional effect of gender and type of institutions in relation to scientific interest of higher secondary schools students is accepted.

R) CONCLUSIONS

In the light of analysis and interpretation of the data as given in the precious chapters the investigator arrived at the following conclusions:

1. There is no significant difference in the scientific interest among higher secondary school students belonging to different gender (male and female).
2. No significant difference in the scientific interest among higher secondary school students belonging to different type of institutions (govt. and private).

3. There is no significant difference in the scientific interest among higher secondary school students on the interactional effect of gender (male and female) and type of institutions (govt. and private).

S) EDUCATIONAL IMPLICATIONS

On the basis of findings and conclusions following are the implications of the present Study:

1) Implications for Curriculum Developers

In science text books, at the end of a chapter there must be some open ended questions to facilitate the diversification of students' thinking. The presentation of content, rather than being in heavily texted mode, should be enriched with what, why and how aspects related to it. There should be sufficient number of practical's, experiments, activities pertaining to a particular concept. This study is helpful for the curriculum developers and policy makers. The policy makers take desirable reformatories step to strengthen proper institutional climate and the practices being adopted in the schools.

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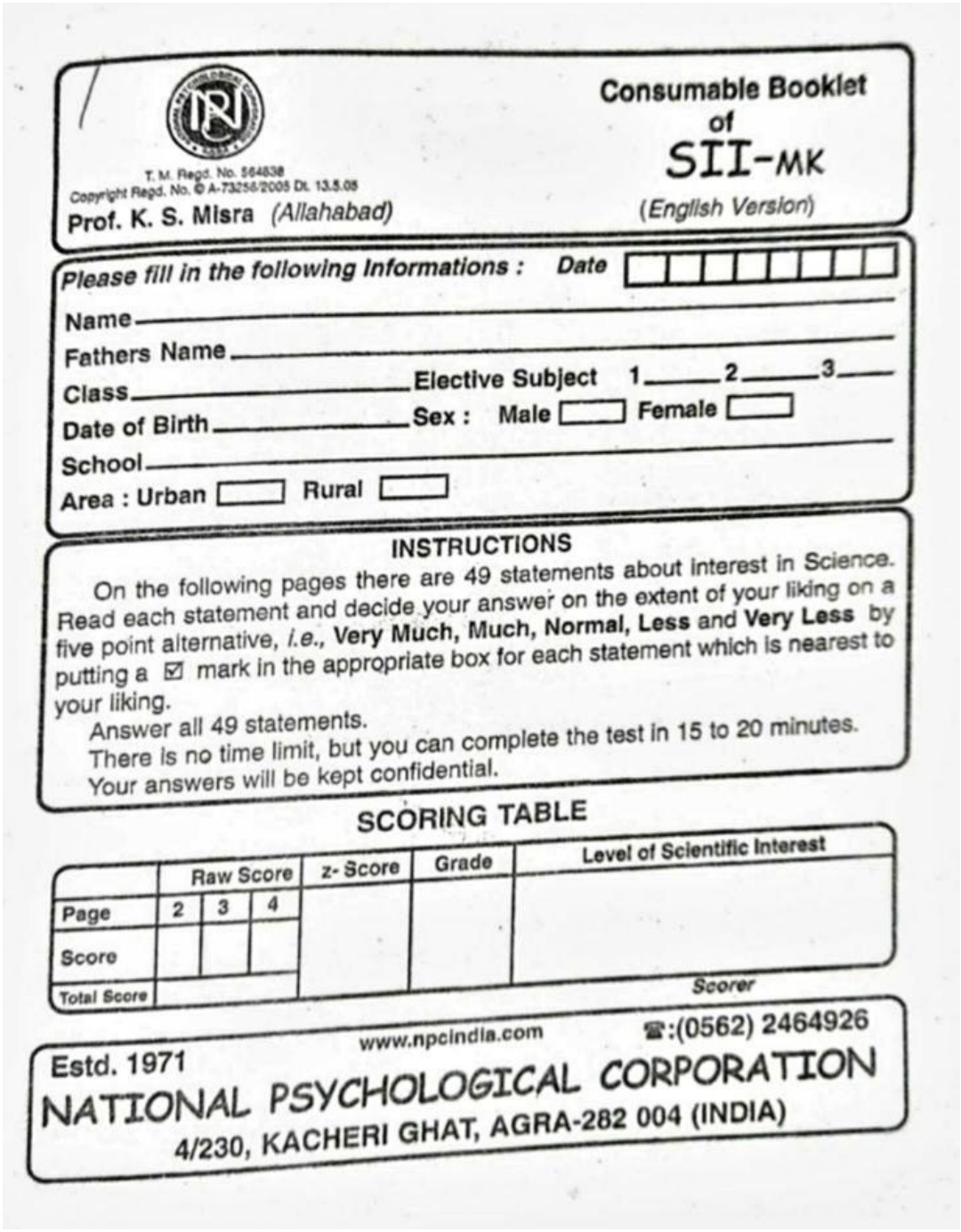
APPENDICES

APPENDIX –A



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Prof. K. S. Misra *(Allahabad)*

Consumable Booklet of SII-MK
(English Version)

Please fill in the following Informations : **Date** ☐☐☐☐☐☐☐☐

Name _____

Fathers Name _____

Class _____ **Elective Subject** 1____ 2____ 3____

Date of Birth _____ **Sex :** **Male** ☐ **Female** ☐

School _____

Area : Urban ☐ **Rural** ☐

INSTRUCTIONS

On the following pages there are 49 statements about interest in Science. Read each statement and decide your answer on the extent of your liking on a five point alternative, *i.e.*, **Very Much, Much, Normal, Less** and **Very Less** by putting a ☑ mark in the appropriate box for each statement which is nearest to your liking.

Answer all 49 statements.

There is no time limit, but you can complete the test in 15 to 20 minutes.

Your answers will be kept confidential.

SCORING TABLE

	Raw Score			z- Score	Grade	Level of Scientific Interest
Page	2	3	4			
Score						
Total Score						

Scorer

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NATIONAL PSYCHOLOGICAL CORPORATION

4/230, KACHERI GHAT, AGRA-282 004 (INDIA)

Sr. No.	Statements	EXTENT OF LIKING THE ACTIVITY					Score
		Very Much	Much	Normal	Less	Very Less	
1.	Ask questions about the life of animals.	☐	☐	☐	☐	☐	☐
2.	Know about the sources of energy.	☐	☐	☐	☐	☐	☐
3.	Know about chemical reactions.	☐	☐	☐	☐	☐	☐
4.	Know the reasons for natural events.	☐	☐	☐	☐	☐	☐
5.	Know about the life of scientists.	☐	☐	☐	☐	☐	☐
6.	Collect information about causes, effects and removal of pollution.	☐	☐	☐	☐	☐	☐
7.	Ask questions about the life of scientists.	☐	☐	☐	☐	☐	☐
8.	Observing organismic activities of animals.	☐	☐	☐	☐	☐	☐
9.	Find answers to questions related to science.	☐	☐	☐	☐	☐	☐
10.	Know about scientific inventions.	☐	☐	☐	☐	☐	☐
11.	Know the functioning of scientific apparatuses.	☐	☐	☐	☐	☐	☐
12.	Viewing science related programmes on television.	☐	☐	☐	☐	☐	☐
13.	Reading science magazines.	☐	☐	☐	☐	☐	☐
14.	Doing experiments given in books.	☐	☐	☐	☐	☐	☐
15.	Listening to the science related lectures of Scientists.	☐	☐	☐	☐	☐	☐
16.	Collecting information by attending a science fair.	☐	☐	☐	☐	☐	☐
17.	Doing experiments by using scientific method in the laboratory.	☐	☐	☐	☐	☐	☐
18.	Observing the experiments being demonstrated by the teacher attentively.	☐	☐	☐	☐	☐	☐
						Total Score	☐

Sr. No.	Statements	EXTENT OF LIKING THE ACTIVITY					Score
		Very Much	Much	Normal	Less	Very Less	
19.	Understanding thoroughly the basis of an experiment.	☐	☐	☐	☐	☐	☐
20.	Reading science textbooks attentively.	☐	☐	☐	☐	☐	☐
21.	Reading science related articles in newspapers attentively.	☐	☐	☐	☐	☐	☐
22.	Writing science related article for annual magazine of the school.	☐	☐	☐	☐	☐	☐
23.	Listening to the lecture of the science teacher attentively.	☐	☐	☐	☐	☐	☐
24.	Solving questions of the science textbooks.	☐	☐	☐	☐	☐	☐
25.	Making cheap and easy apparatuses related to science.	☐	☐	☐	☐	☐	☐
26.	Participating in science quiz competition.	☐	☐	☐	☐	☐	☐
27.	Make working model related to science.	☐	☐	☐	☐	☐	☐
28.	Complete science related projects.	☐	☐	☐	☐	☐	☐
29.	Collecting animals and plants for the Museum.	☐	☐	☐	☐	☐	☐
30.	Observing animals and plants kept in the Museum.	☐	☐	☐	☐	☐	☐
31.	Talking to the science teacher about a topic related to science.	☐	☐	☐	☐	☐	☐
32.	Talking to a friend about a topic related to science	☐	☐	☐	☐	☐	☐
33.	Become a member of science club.	☐	☐	☐	☐	☐	☐
34.	Viewing science related film.	☐	☐	☐	☐	☐	☐
						Total Score	☐

Sr. No.	Statements	EXTENT OF LIKING THE ACTIVITY					Score
		Very Much	Much	Normal	Less	Very Less	
35.	Teach science subject to younger brother and sister.	☐	☐	☐	☐	☐	☐
36.	Solve science related puzzle of friend.	☐	☐	☐	☐	☐	☐
37.	Draw figures related to science.	☐	☐	☐	☐	☐	☐
38.	Think of the simple ways to do science experiments.	☐	☐	☐	☐	☐	☐
39.	Know about how to maintain an aquarium.	☐	☐	☐	☐	☐	☐
40.	Know about various types of plants while visiting a botanical garden.	☐	☐	☐	☐	☐	☐
41.	Reading about various animals and plants in an encyclopedia.	☐	☐	☐	☐	☐	☐
42.	Observing a specimen in the laboratory.	☐	☐	☐	☐	☐	☐
43.	Going on a scientific educational tour.	☐	☐	☐	☐	☐	☐
44.	Taking photographs of various plants.	☐	☐	☐	☐	☐	☐
45.	Collect photographs of various types of animals.	☐	☐	☐	☐	☐	☐
46.	Talking about a science topic that is not clear.	☐	☐	☐	☐	☐	☐
47.	Observing various planets in a planetorium.	☐	☐	☐	☐	☐	☐
48.	Know about the atmosphere.	☐	☐	☐	☐	☐	☐
49.	Understanding the structure of scientific equipments.	☐	☐	☐	☐	☐	☐

Total Score ☐

Appendix - B

Raw scores of boys and girls on scientific interest

S.No	Raw scores
1.	131
2.	145
3.	125
4.	154
5.	178
6.	134
7.	108
8.	155
9.	142
10.	172
11.	120
12.	150
13.	166
14.	159
15.	135
16.	143
17.	177
18.	154
19.	170
20.	187
21.	175
22.	138

23.	158
24.	175
25.	153
26.	194
27.	186
28.	176
29.	141
30.	150
31.	201
32.	176
33.	184
34.	176
35.	120
36.	185
37.	166
38.	180
39.	121
40.	161
41.	178
42.	158
43.	169
44.	129
45.	174
46.	135
47.	183

48.	128
49.	178
50.	201
51.	198
52.	159
53.	157
54.	136
55.	169
56.	150
57.	148
58.	171
59.	160
60.	216
61.	163
62.	132
63.	155
64.	211
65.	176
66.	155
67.	172
68.	154
69.	165
70.	178
71.	186
72.	189

73.	182
74.	188
75.	184
76.	172
77.	130
78.	167
79.	119
80.	196
81.	131
82.	190
83.	204
84.	216
85.	182
86.	177
87.	214
88.	199
89.	188
90.	140
91.	217
92.	185
93.	167
94.	148
95.	193
96.	118
97.	147

98.	200
99.	191
100.	145
101.	184
102.	154
103.	200
104.	215
105.	160
106.	169
107.	181
108.	172
109.	178
110.	194
111.	205
112.	182
113.	169
114.	152
115.	172
116.	187
117.	140
118.	209
119.	168
120.	143
121.	171
122.	132

123.	193
124.	195
125.	170
126.	199
127.	116
128.	190
129.	162
130.	175
131.	187
132.	170
133.	181
134.	177
135.	194
136.	146
137.	151
138.	154
139.	194
140.	201
141.	151
142.	161
143.	192
144.	158
145.	140
146.	155
147.	152

148.	161
149.	169
150.	150
151.	147
152.	165
153.	178
154.	180
155.	201
156.	141
157.	163
158.	159
159.	124
160.	162