

Study of Relationship Between Scientific Attitude And Achievement in Science of 11th Grade Student

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ABSTRACT - The Objective of the study is to analyze the influence of scientific attitude on academic achievement of high school students based on survey. The research is consisted of 100 science students (50 boys and 50 girls) of 11th grade. Scientific attitude scale developed by Shailza Bhagwat was used in the research. In order to analyze data obtained from the survey various stastical tools were used such as t-test, ANOVA test etc in order to reach out the final conclusion .

The conclusion of the work is although not very encouraging but is of great importance as it provides the specific information regarding the level of scientific attitude and academic achievement of the sample under question in which the scientific attitude is found to be 46% whereas the academic achievement is 49.3%..

Key words : Scientific Attitude , Achievement , High School, Students

I. INTRODUCTION

Education is the process of bringing desirable changes in the behaviour of human beings. It can also be defined as the process of imparting or acquiring knowledge and habits through instruction or study. Education comprises instruction, teaching, information gathering, knowledge gathering and transmittance, study and reflection, discussion, demonstration of pilot programmes. Imparting knowledge is only a fragment of education. Real education strives to awaken curiosity of children, develop creative and critical thinking in them and inculcate desirable values.

Education is the means to a better way of living for many and for others. It is the process of teaching required skills. Education is concerned with teaching the members of the society how they are expected to behave in variety of selected situations. Education is an activity or a process, which transforms the behaviour of a person from instinctive behaviour to human behaviour. Mangal, 2005

CHANGING NATURE OF SCIENCE CURRICULUM

National curriculum for Primary and Secondary Education: A Framework (1985) has highlighted the need for core curriculum where science will be an integral part from 1st to 10th Grade. Science will be started as environmental studies at the lower primary stage and will be taken as science at the upper primary stage. The main thrust is towards the realization of developmental and integrative aspects of education.

At the +2 stage science will be one of the optional subjects. It has been suggested that, "content of science is to be

organized on the basis of two guidelines, namely, contemporary science and the learning ability of the child". It is also envisaged that there will be flexibility in terms of selection of content and learning experiences, which would facilitate the continuous and comprehensive evaluation that includes both scholastic and non-scholastic aspects of education. These approaches reflect the changing nature of science curriculum.

DEVELOPING SCIENTIFIC ATTITUDE AMONG THE CHILDREN:

It is the responsibility of the science teachers to develop scientific attitude in children. The following methods can be used to develop scientific attitude in children.

1. Practical Work: More of the activities must be given. Individual practical method and individual projects can be assigned to students. Students are to follow intellectual honesty. Systematic observation and recording should be encouraged. They should be encouraged to draw conclusions from observed data.

2. More Applied Knowledge: All the details and knowledge gathered should be correlated to life situation. They must be made to think scientifically. How, why, when, what, where must be the questions put forward by the students.

3. Discussion: The teacher should give more chances for discussion. Freedom and decision making are to be stressed. Direct experience can be give to them when they analyses any experiment. Leadership qualities can be

developed by discussion method when the leader takes the responsibilities.

4. Wide Reading: Students must be encouraged to read more and more reference books. They must be encouraged to write articles in college magazines. Model making, running a science club and reading science news may induce scientific attitude.

5. Co-curricular Activities: Apart from normal curricular activities, co-curricular and extra-curricular activities can be arranged. Science clubs, literary associations, conducting science fairs, exhibitions, writing articles in science, conducting excursions may help students to develop scientific attitudes.

6. Curriculum: An enthusiastic teacher can help in developing the scientific attitude through the curriculum. The teacher should suggest projects which give the pupils training in problem-solving.

ACHIEVEMENT:

The phrase 'achieves' signifies the level of educational development of an individual as determined by the score of an achievement test designed to measure the knowledge or proficiency in theoretical study acquired by normal education.

Achievement means the extent to which the learner has learnt in the subject over a period of study. The achievement motive comes from needs to pursue excellence, accomplish lofty goals or succeed on difficult tasks. If the satisfaction of personal potentialities is emphasized the achievement motive may be clarified as a good motive.

INFLUENCE ON ACHIEVEMENT:

Some of the important influence on achievement is as follows: we know that incentives are important which appear to arouse cognition's and emotions. People analyze, consciously or unconsciously, the value of attaining the goal suggested by the incentive. Is it worth the effort? What are the short and long term consequences or success?

Recent research indicates that incentives are more motivating when immediate success is valued over future opportunities. Incentives arouse memories of past performances in similar situations. Memories influence expectations about the probability of reaching the goal. Varied cognitions and associated emotions evoke some degree of achievement motivation. They may elicit anxieties associated with failure and success too.

Even when motivation is optimally high and anxieties are low, success depends to some extent on a person's energy, intelligence and skills. To predict how a given individual will perform in a specific achievement setting, we must consider all these factors.

- i) Conditions influencing Achievement

- ii) Socio-economic status of the students
- iii) Home climate
- iv) School climate
- v) Surrounding climate
- vi) The classroom atmosphere and
- vii) The peer group relationship

RELATIONSHIP BETWEEN ACHIEVEMENT AND SCIENTIFIC ATTITUDE:

Achievement in the school may be taken to mean any desirable learning that is observed in the student. There is no gain saying the fact that learning is not limited to mere acquisition of information, it also includes attitudes, interests, values etc. Although 'achievement' is used in this broad sense, it is customary for schools to be concerned to a great extent with the development of knowledge, understanding and acquisition of skills. Academic achievement is related to the acquisition of principles and generalizations and the capacity to perform efficiently certain manipulations of objects, symbols and ideas.

Studies indicate clear association between scientific attitude and achievement. Attitude was a stronger predictor of achievement (Tingley, Paul B. 1997). According to Warren, Charles Robert (1991), the most significant predictor of science achievement was student's attitude about their ability to perform science class across grade levels. Studies of Wallace, Stephen R reveals that prior attitude towards science significantly influences science achievement only in 8th and 9th grade students. Thus scientific attitude has much influence upon the academic achievement of students.

II. NEED OF THE STUDY

Objectives proposed for science education always include the development of interests, values, attitudes, aptitudes, and appreciation. Why these are so important and why we should include them in the school curriculum has long been under discussion.

Science educators have long recognized that scientific attitudes are among the most important outcomes, which should result from science teaching.

There is a general agreement among the investigators that an individual with scientific attitude looks for natural cause of events; is open-minded toward the work and opinion of others, bases opinions and conclusions on adequate evidence; evaluate techniques and procedures used to get information; obtained is curious concerning the things he observes; accuracy in observation in experimentation and presentation of data, suspends judgments until accurate information is available, looks for cause and effect relationships; criticalness including self-criticism; shows intellectual honesty; free from bias and prejudice; averse to superstition, maintains such ideals as honesty; patience, persistence, fairness and thoroughness

It has also been realized that without developing scientific attitude, any amount of knowledge in science contributes little to national development and to the process of social change. This is why development of scientific attitude through science lessons has been emphasized by science educators. Unfortunately, this important aspect, scientific attitude, of science teaching has not been studied properly by the research workers. Hence in the present study the researcher has undertaken to study the level of scientific attitude possessed by the ix standard students of Ranchi District.

SCOPE OF THE STUDY:

Scientific attitude is a complex behavioural aspect of science. It has so many characteristics and it can be attributed to as many situations as we discuss in science education. We can use, it to study at various educational levels, say primary to post-graduate; we can use it to associate with various school subjects we can use it to relate with sex, residence, type of school, teaching and learning situations, physical facilities, and so on. But the present study of scientific attitude is concerned with the secondary school pupils, viz., IX Standard students. It is also concerned with the sex, management of the school, locality of the school, residential or non-residential, and nature of school. The scientific attitude aspects studied in this study are rationality, curiosity, aversion to superstitions, objectivity of intellectual beliefs, and suspended judgment.

IMPORTANCE OF THE STUDY:

Science, in curriculum, provides certain values which are not provided by any other subject. All the school subjects are taught because they provide liberal education; they are part of the equipment and preparation for life which we expect the school to give to its pupils so that they may play their part in the community as intellectual citizens. Science takes its place side by side with other subject as an essential element of one's education. It affords knowledge of certain facts and laws and an insight into methods and data peculiar to the domain of science. However, the inclusion on any subject in the curriculum should satisfy the intellectual, utilitarian, vocational, cultural, moral and aesthetic values. Besides these, the teaching of science imparts training in the scientific method and develops scientific attitude and scientific aptitude, which are very valuable and at the same time are transferable to other situations of life. The scientific attitude plays a major role in science education, and in the lives of pupils pursuing science education. Identifying the importance of science education, the Science Policy Resolution (1958) of the Government of India stated that the dominating feature of the contemporary world is the intense cultivation of science on a large scale and its application to meet the country's requirements. And science has now become a compulsory subject in school

curriculum, and is trying to inculcate scientific attitude besides preparing the pupils for leading quality life.

STATEMENT OF THE PROBLEM

A study of the relationship between scientific attitude and achievement in science of 11th grade students .

OBJECTIVES OF THE STUDY:

- ❖ To compare the scientific attitude of boys and girls of 11th grade science students.
- ❖ To compare the achievement in science of boys and girls of 11th grade science students.
- ❖ To see the impact of Father's qualification on scientific attitude of 11th grade science students.
- ❖ To see the impact of Mother's qualification on scientific attitude of 11th grade science students.
- ❖ To see the impact of Father's occupation on scientific attitude of 11th grade science students.
- ❖ To see the impact of Mother's occupation on scientific attitude of 11th grade science students.

METHOD ADOPTED IN THE PRESENT STUDY:

The investigator has chosen the survey method to **study the relationship between scientific attitude and achievement in science of 11th grade students**. Survey is a "fact finding" study. John W. Best (2006) states, "The survey method gathers data from a relatively large number of cases at particular time." It involves interpretation, measurement, classification, evaluation and generalization. All directed towards a proper understanding and solution of significant educational problems. Thus survey approach is necessary for the collection of facts and information relevant to the problem, the investigator deals with.

POPULATION AND SAMPLE :

The population of this study consisted XIth grade science students . . For this study, 100 science students (50 Boys & 50 Girls) of XIth standard was taken from randomly chosen two schools of Ranchi District (Jharkhand).

TOOLS USED IN THE PRESENT STUDY:

In an effort to study students' attitudes towards Science, the investigator used Standardized **Shailaja Bhagwat's Scientific Attitude Scale**. It was constructed in 1970's. Likert scale consisting of 24 items with "1" representing strongly disagree and "5" representing strongly agree for positive items. Weightings for negative items were reversed in computation.

III. METHOD OF DATA ANALYSIS

Data collected for this study were analyzed using *Median, Standard Deviation, t- Test and ANOVA Test*.

RESULTS:

NULL HYPOTHESIS 1:

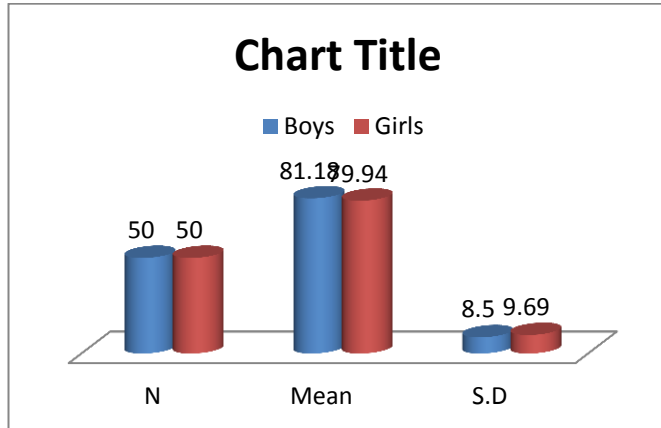
There is no significant difference in scientific attitude of boys and girls of 11th grade science students.

TABLE 1 : shows the summary of **t- value**

TABLE - 1

Gender	N	Mean	S.D	df	t-ratio	Level of significance
Boys	50	81.18	8.50	98	0.68	N.S*
Girls	50	79.94	9.69			

N.S* = Not significant



For 98 degree of freedom at 5% level of significance , the table value of ‘t’ is 1.98 and calculated value ‘t’ is 0.68 which is less than the tabled value. Hence the Null hypothesis is not rejected .There is no significance difference in the scientific attitude of science students of class XI on the basis of gender.

NULL HYPOTHESIS 2:

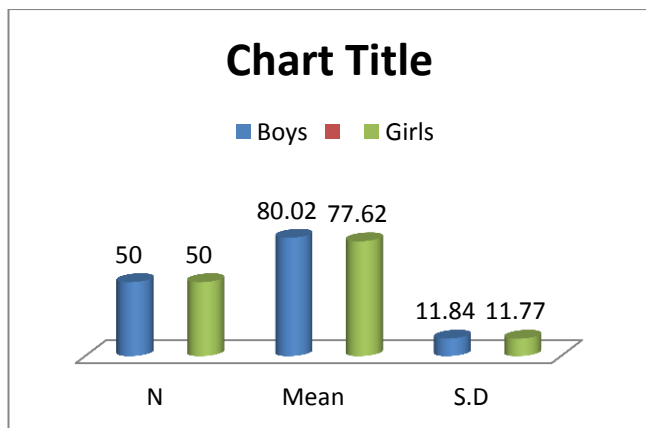
There is no significant difference in achievement in science of boys and girls of 11th grade science students.

TABLE .2 Shows the summary of **t - value**

TABLE -2

Gender	N	Mean	S.D	df	t-ratio	Level of significance
Boys	50	80.02	11.84	98	1.03	N.S*
Girls	50	77.62	11.77			

N.S* = Not significant



For 98 degree of freedom at 0.05 level of significance , the table value of ‘t’ is 1.98 and calculated value ‘t’ is 1.03 which is less than the t – value of the table .Hence the Null hypothesis is not rejected .There is no significance difference in the achievement of boys and girls in science of 11th grade science students.

NULL HYPOTHESIS 3:

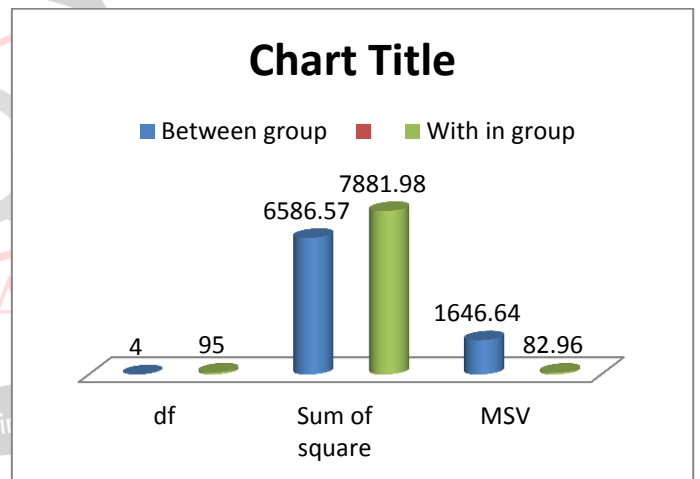
There is no significant difference in scientific attitude of science students of class XIth on the basis of their father’s qualification.

TABLE 3 shows the summary of F- value.

TABLE :.3 SHOWING F-RATIO

Source of variation	df	Sum of square	MSV	F-ratio	Level of significance
Between group	4	6586.57	1646.64	19.84	Beyond 0.01 level
With in group	95	7881.98	82.96		

For 4/94 df at 5% level of significance the table value of **F** is 2.47



For 4/94 degree of freedom at 0.05 level of significance, the table value of ‘**F**’ is 2.47 and the calculated value of ‘**F**’ is 19.84 which is more than the ‘**F**’ value of table . Hence the null hypothesis is rejected .Thus, there is significant difference in the scientific Attitude of science students of class XIth on the basis of their Father’s qualification. It means Father’s qualification influences the scientific Attitude.

NULL HYPOTHESIS 4:

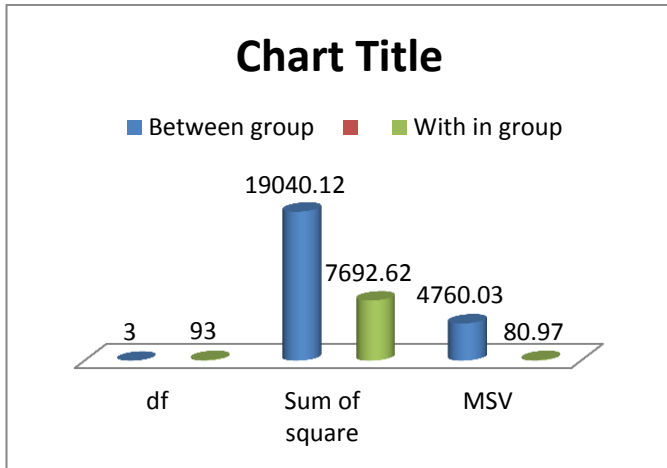
There is no significant difference in scientific attitude of science students of class XI on the basis of their mother’s qualification.

TABLE 4 shows the summary of **F- value**

TABLE 4 SHOWING F-RATIO

Source of variation	df	Sum of square	MSV	F-ratio	Level of significance
Between group	3	19040.12	4760.03	58.78	Beyond 0.01 level
With in group	93	7692.62	80.97		

For 3/94 df at 5% level of significance the table value of **F** is 2.47



For 3/94 degree of freedom at 0.05 level of significance, the table value of '**F**' is 2.71 and the calculated value of '**F**' is 58.78 which is more than the '**F**' value of table. Hence the null hypothesis is rejected. Thus, there is significant difference in the scientific Attitude of science students of Class XI on the basis of their mother's qualification. It means mother's qualification influences the scientific Attitude.

NULL HYPOTHESIS 5:

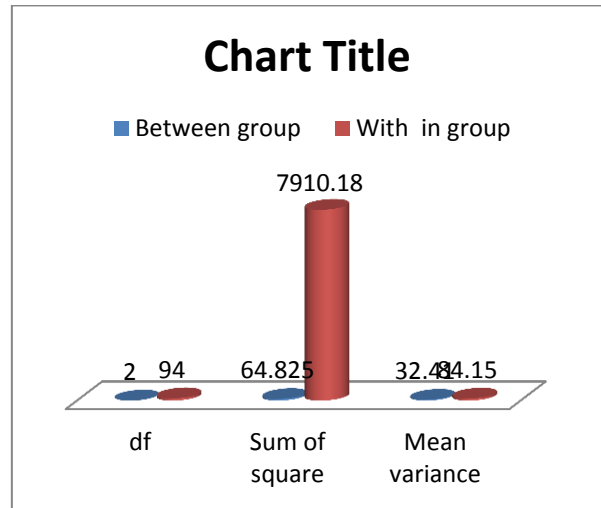
There is no significant difference in scientific attitude of science students of class XI on the basis of their father's occupation.

TABLE 5 : shows the summary of **F- value**

TABLE -5 SHOWING F-RATIO

Source of variation	df	Sum of square	Mean variance	F-ratio	Level of significance
Between group	2	64.825	32.41	0.385	* N.S.
With in group	94	7910.18	84.15		

For 2/94 df at 5% level of significance the table value of **F** is 3.10



For 2/94 degree of freedom at 0.05 level of significance, the table value of '**F**' is 3.10 and the calculated value of '**F**' is 0.385 which is less than the '**F**' value of table. Hence the null hypothesis is accepted. Thus, there is no significant difference in the scientific Attitude of science students of class XI on the basis of their Father's occupation. It means Father's occupation doesn't influence the scientific attitude of students.

NULL HYPOTHESIS 6:

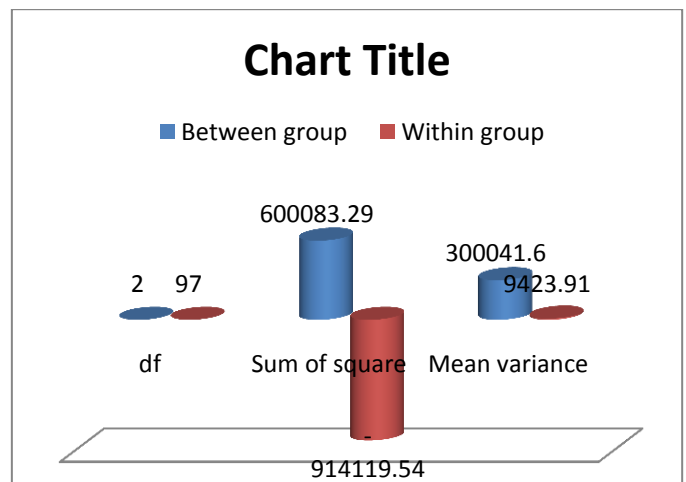
There is no significant difference in scientific attitude of science students of class XI on the basis of their mother's occupation.

TABLE :6 shows the summary of **F- value**

TABLE : .6 SHOWING F-RATIO

Source of variation	df	Sum of square	Mean variance	F-ratio	Level of significance
Between group	2	600083.29	300041.6	-31.83	* N.S.
Within group	97	914119.54	9423.91		

For 2/97 df at 5% level of significance, the table value of **F** is 3.10.



For 2/97 degree of freedom at 0.05 level of significance, the table value of '**F**' is 3.10 and the calculated value of '**F**' is -31.83 which is less than the '**F**' value of

table . Hence the null hypothesis is accepted .Thus, there is no significant difference in the scientific Attitude of science students of class XIth on the basis of their mother's occupation .It means mother's occupation doesn't influences the scientific attitude of students.

IV. FINDINGS AND INTERPRETATION

- The t test reveals that there is no significance difference in the scientific attitude of science students of class XI on the basis of gender.
- The 't' test reveals that there is no significant difference in Achievement of class XI science boys and girls.
- The ANOVA test reveals that there is that is significant difference in scientific Attitude of science students of class XI on the basis of their father's occupation. It means father's qualification influences the scientific attitude.
- The ANOVA test reveals that there is significant difference in scientific Attitude of science students of class XI on the basis of their mother's occupation. It means mother's qualification influences the vocational choice.
- The ANOVA test reveals that there is significant difference in scientific Attitude of science students of class XI on the basis of their father's qualification. It means Father's occupation doesn't influences scientific attitude.
- The ANOVA test reveals that there is significant difference in scientific Attitude of science students of class XI on the basis of their mother's occupation . It means mother's occupation doesn't influences scientific attitude.

FINDINGS:

Level of Scientific Attitude

- 2 % of high school students have low, 29% of them have moderate and 57 % of them have high, 12 % of them have very high level of Scientific Attitude in total.
- 2 % male students have low, 24% of them have moderate and 62 % of them have high, 12 % of them have very high level of Scientific Attitude in total.
- 2 % of female students have low, 34% of them have moderate and 52% of them have high, 12 % of them have very high level of Scientific Attitude in total.
- 4 % Government school students have low, 28% of them have moderate and 52 % of them have high, 16 % of them have very high level of Scientific Attitude in total.

Association between Scientific Attitude and its Dimension's and the Background Variables:

- There is significant association between Father's Education and their Scientific Attitude in total.

- There is significant association between Mother's Education and their Scientific Attitude in total.
- There is no significant association between Father's Occupation and their Scientific Attitude in total.
- There is no significant association between Mother's Occupation and their Scientific Attitude in total.

Association between Academic Achievement and Background Variables:

- There is significant association between father's education and Academic Achievement.
- There is significant association between mother's education and Academic Achievement.
- There is no significant association between father's occupation and Academic Achievement.
- There is no significant association between mother's occupation and Academic Achievement.

V. RECOMMENDATIONS

The facilities like library, laboratory, audio-visual aids, and exposure to eminent personality's participation in fairs, exhibitions, etc., should be given for inculcation and promotion of Scientific Attitude in the individuals.

1. A teacher without proper Scientific Attitude cannot develop or promote it. All the science educators must try to promote the Scientific Attitude in the pupils by implementing factors that are feasible in their own educational set up.
2. From informative experiences about the attitudes object, situations arising in solving a problem and pleasant emotional experiences Scientific Attitude can be developed.
3. By providing well-equipped labs and group decision making, encouragement in the cultivation of desirable attitude can promote Scientific Attitude.
4. Providing opportunity for the analysis of problem and amount of scientific knowledge or exposure to general science courses can be promoted Scientific Attitude.
5. Taking the pupils to exhibitions, excursions, field trips, zoos, parks, and industries, natural habits of plants and animals also improve Scientific Attitude.
6. By allowing the pupils to mingle with various peer and intellectual groups and exposing them to the eminent personalities like scientists, social reformers can also use to develop the Scientific Attitude.

VI. SUGGESTIONS FOR FURTHER RESEARCH

The present study on Scientific Attitude brings to light that a good number of new areas can be studied by the future researchers. The areas and variables which are not covered by this study may be put to test to enlighten the factors associated with the inculcation and development of Scientific Attitude. So the researchers may think of the following areas to study in detail.

1. Studies on Scientific Attitude may be extended to the other educational levels, viz., primary and college levels at district as well as state level.
2. Studies on Scientific Attitude in other subjects may also be taken up.
3. Studies may be conducted on Scientific Attitude at various levels of education, areas and variables.
4. Studies may be taken up in other dimensions of Scientific Attitude.
5. Studies may be taken up to find out the effect of independent variables on dependent variables in the cases of controlled and experimental groups as this study has not used any special controlled variables.
6. Studies may be conducted to find out the effect of environmental and psychological factors on the inculcation and development of Scientific Attitude.
7. Studies about the Scientific Attitude possessed by the teaching community may be taken up as this factor has a great role to play in the development of Scientific Attitude in the classrooms.
8. Studies may be taken up to identify the reasons for the possession of average Scientific Attitude as found in this study.
9. Studies may be carried out to identify the factors affecting the lesser levels of possession of Scientific Attitude in the cases of variables studied in this study.
10. Studies on the role of science exhibitions, science clubs and field trips in the cultivation and improvement of Scientific Attitude may be undertaken.
11. Studies may be conducted on the use of audio-visual teaching aids, laboratory and library facilities available in the schools as these have greater influence on Scientific Attitude.

REFERENCES

- [1] BEST, W.J. & KHAN, J.V. (2003), Research in Education, Boston, A Pearson Education Company, New Ed.
- [2] CHAUHAN, S.S. (2006), Innovations in Teaching – Learning Process, Simla, Vikas Publishing House PVT LTD.
- [3] CHOWDHRY, K. (2006), Total Quality Management, New Delhi, Omega Publications, PP.1-12.
- [4] JOESPH, L.B., (Chief Editor) (2002) “Brothers of St Gabriel: A 100 Year History of Indian Mission 1903-2003”. Tiruchirapali, Promoforce Print Systems, P.546-549, 551-559.

- [5] KOTHARI C. R. (1990), Research Methodology Methods and Techniques, New Delhi, Wishwa Prakashan.
- [6] KOUL, L. (1984), Methodology of Educational Research, New Delhi, Vikas Publishing House Pvt., Ltd.,
- [7] MARMAR, M. (2005), Total quality Management in Education, New Delhi, Sage Publications, 2nd ed.
- [8] RAO, V. K. (2003), Quality Education, New Delhi, A.P.H. Publishing Corporation, p.13.
- [9] SIDHU, K. S. (1992), Methodology of Research in Education, New Delhi, Sterling Publishers Pvt., Ltd.
- [10] STELLA, A. D. GNANAM, A. (2003), Foundations of External Quality Assurance in Indian Higher Education, New Delhi, Concept Publishing Company, PP. 39-42, 147-175.
- [11] VIJAYAN, NAMBIAR. (2006), ‘Methods for quality education’. Hyderabad. Neelkamal Publications, Reprint, P. V-VIII (Preface).

JOURNALS:

- [12] Anweshika. “Factors of Quality Improvement in Higher and Professional education in India”, Indian Journal of Teacher education, Vol 4, NO I, June 2007.
- [13] Arulsamy. S. “An Investigation into Secondary School Teachers’ Self-efficacy in teaching”, Research and Reflection on education, Vol – 6, NO – 3, July- Sept, 2008. P.22-24.
- [14] Avinashilingam, Vijaya, N. A. & Singh, Upayana. “Identification of factors that influence the students’ academic performance”, Journal of Education Research & Extension, Vol – 42-1, Jan-March 2005, P.25.
- [15] Shishak, Tuiseem. “Quality education worth fighting for” New Frontier’s in Education, International Journal of Education, Vol – 27, NO-2, April-June, 2007, P.132.

WEBSITES

- [16] http://pdf.usaid.gov/pdf_docs/PNADH772.pdf
- [17] <http://www.auqa.edu.au/auqf/pastfora/2004/program/papers/Chua.pdf>
- [18] <http://ehlt.flinders.edu.au/education/iej/articles/v6n1/Iyamu/paper.pdf>
- [19] <http://www.unicef.org/girlseducation/files/QualityEducation.PDF>
- [20] <http://www.commonwealtheducationfund.org/downloads/downloads/documents/PPRC%20Policy%20Brief%20Bangladesh.pdf>