



Scientific attitude: a study among higher secondary students

Dr. A. Stephen Harris Paul

Asst. Professor

PSN College of Education, Tirunelveli-627152

Abstract: Science is the greatest invention of Humankind. It is the systematic process of gathering knowledge about the universe. Study of Science should provide proper opportunity for the development of scientific temperament and attitude among the students; Scientific attitude is necessary to an individual to lead a smooth and comfortable life in the society. The present study was aimed at investigating the scientific attitude among higher secondary students and observing the influence of type of school, medium of instruction and group of study. A sample of 1126 higher secondary students was selected using stratified random sampling technique. The study indicates the average level of scientific attitude among higher secondary students. Also it is inferred here that the differences in the scientific attitude might have been influenced by the group of study of students and type of school. Anyhow it is inferred here that medium of instruction does not bring any significant variations in students' scientific attitude.

Keywords: Attitude, Higher secondary students, Karaikal, Scientific Attitude

Introduction

Science education has become an integral part of human life, without which humanity cannot live effectively in this 21st century. Science education develops ability, reasoning, curiosity, creativity, positive attitude and problem solving approach and these abilities must be developed in each and every citizen (Husain & Idris, 2010). Science education has an important role to play in the all-round cultural and societal development of human kind and for evolving a civilized society (Sharma & Gore, 2015). The focus of higher secondary education has largely been on Science as a practical subject and partly an empirical subject. Higher secondary education is the cornerstone of educational system as it is the gateway of opportunities and benefits of economic and social development to the youngsters.

Review of Related Literature

Sekar and Mani (2013) conducted a study on scientific attitude of Biology students in higher secondary schools. The sample consisted of 621 students from XI standard randomly drawn from Thiruvannamalai District, Tamilnadu. The findings of the study show a moderate level of scientific attitude among higher secondary students. Further the women teachers who teach biology has more influence on developing scientific attitude among the students than the male teachers. The study further shows that girls significantly differ with boys in scientific attitude.

Jancirani, Dhevkrishnan and Devi (2012) conducted a study on scientific attitude of adolescent students in Namakkal District. The findings of the study reveal significant difference in their scientific attitude with respect to gender, locality, medium of instruction and type of management. The findings also reveal that boys have higher level of scientific attitude than girls



and urban students have higher level of scientific attitude than rural students. Students studying in English medium have higher level of scientific attitude than students studying in Tamil medium. The result also indicates that the students from self financed schools are better in their scientific attitude than the students from Government schools and Government aided schools.

Significance of the Study

Science is a way of understanding the world, a perspective and a pattern of thinking that begins early in one's life (Mudasir and Yatu, 2013). The main objective of science instruction is to made the pupil aware of the scientific procedure and to inculcate scientific attitude in their mind. Study of Science should provide proper opportunity for the development of scientific temperament and attitude among the students; it should create a spirit of curiosity for knowing new things, discovering their environment and penetrating deeply into the nature of the things, and events surrounding them (Jancirani, Dhevkrishnan and Devi, 2012). Science learning is made effective by developing adequate scientific attitude through effective Science teaching (Moore and Foy, 1997).

Scientific attitude is an intrinsic quality. Scientific attitude is a tendency to react consistently to a novel or problematic situation. A student working on scientific procedures inculcates the values like patience, perseverance, truthfulness, honesty and determination. Scientific attitude is necessary to an individual to lead a smooth and comfortable life in the society. Hence, the investigator designed a study to analyse scientific attitude of higher secondary students.

Operational Definitions

Scientific attitude is a logical way of thinking clearly, and reasonably without any disturbance or prejudice. The attitudes such as Rationality, Curiosity, Open-Mindedness, Faith-in-scientific method, Aversion to superstition have been taken into consideration to select the scientific attitude scale for the present study.

Higher Secondary Students

Higher secondary students who are undergoing regular courses in XI and XII standard in Government schools, Government aided schools, private schools and CBSE schools are considered as higher secondary students. . Here the investigator considers only plus two students for this study.

Objectives of the Study

The main objectives of the present study as follows:

1. To study the level of scientific attitude among. higher secondary students.



2. To find out the significant difference in the scientific attitude among higher secondary students with respect to type of school.
3. To find out the significant difference in the scientific attitude among higher secondary students with respect to medium of instruction.
4. To find out the significant difference in the scientific attitude among higher secondary students with respect to group of study.

Hypothesis of the study

1. The level of scientific attitude among higher secondary students is average and equal.
2. There is no significant difference in scientific attitude among higher secondary students with respect to type of school (Boys' school, Girls' school and Co-educational school).
3. There is no significant difference in scientific attitude among higher secondary students with respect to medium of instruction.
4. There is no significant difference in scientific attitude among higher secondary students with respect to group of study (Mathematics, Science and Computer Science).

Methodology

The investigator adopted survey method for the present study. The sample of the present study comprised of XII standard students studying in Karaikal dist. In the present study stratified random sampling technique was used to select the samples. A sample of 1126 students were selected from 18 schools. The Scientific Attitude Scale constructed and validated by investigator. In order to establish the reliability the cronbach alpha co-efficient was estimated for scientific attitude. It was calculated to be 0.736. The intrinsic validity was established by taking the square root of the reliability coefficient which was found to be 0.8579.

Collection of Data

In order to collect data regarding the objectives of the study, the tool scientific attitude with personal data sheet was administered on the sample of higher secondary students. The investigator gave a brief explanation of the objective and scope of the study to the students and appealed to their conscious involvement and co-operation.

Analysis and Interpretation of Data

The data were analyzed by utilizing percentage analysis, descriptive statistics, and differential analysis, using Statistical Package for Social Sciences (SPSS).



Hypothesis 1 : The level of scientific attitude of higher secondary students is average and equal

In order to find out the level of scientific attitude among the higher secondary students, the total scores obtained were classified into three categories: high, average and low.

The range of each level of scientific attitude

Variable	Mean	Standard deviation	Range		
			High	Average	Low
Scientific attitude	203.75	16.93	above 220	187 to 220	Below 187

Table 1

Distribution of respondents according to the level of scientific attitude

Variable	Low		Average		High	
	No.	%	No.	%	No.	%
Scientific attitude	145	12.9	807	71.7	174	15.4

It is observed from the table 1 that 12.9 percent, 71.7 percent and 15.4 percent of higher secondary students have low, average and high level of scientific attitude respectively. Therefore it is inferred here that the level of scientific attitude of higher secondary students is 'more of average but not equal'.

Hypothesis 2 : There is no significant difference in scientific attitude of higher secondary students with respect

to type of school (Boys' school, Girls' school and Co-educational school)

Table 2

Difference in scientific attitude of higher secondary students with respect to type of school

Variable	Sources of variation	Sum of squares	df	Mean square	F value	Level of significance
Scientific Attitude	Between groups	3505.640	2	1752.820	6.166	p < 0.05 Significant
	Within groups	319233.224	1123	284.268		

The calculated F value (6.166) for scientific attitude is greater than the critical value 3.00 at 0.05 level of significance with df 2/1123. This implies that the difference in mean score of scientific attitude of higher secondary students is significant at 0.05 level. Hence the null hypothesis, "There is no significant difference in scientific attitude among three sub groups of higher secondary students based on their type of school" is rejected. Therefore, it is inferred here that the



difference in the scientific attitude might have been influenced by the type of school. While comparing meanscore it is found that students from girls' schools and students from co-educational schools are better than students from boys' schools in their scientific attitude.

Hypothesis 3 : There is no significant difference in scientific attitude of higher secondary students with respect

to medium of instruction.

Table 3

Difference in scientific attitude of higher secondary students with respect to medium of instruction

Variable	Tamil N = 415		English N= 711		't' value	Level of significance
	Mean	SD	Mean	SD		
Scientific attitude	203.80	18.130	203.71	16.214	0.088	p > 0.05 Not significant

From the table 3, it is observed that the obtained 't' value with respect to scientific attitude (0.088) is lower than the table value (1.96) at 0.05 level of significance with df 1124. This shows that students of Tamil and English medium do not differ significantly in their scientific attitude. Hence the respective null hypothesis, "There is no significant difference in scientific attitude among higher secondary students with respect to medium of instruction" is not rejected. Therefore it is inferred here that medium of instruction does not bring any significant variations in students' scientific attitude.

Hypothesis 4 : There is no significant difference in scientific attitude of higher secondary students with respect

to group of study (Mathematics, Science and Computer Science)

Table 4

Difference among students of Mathematics, Science and Computer Science in their scientific attitude

Variable	Sources of variation	Sum of squares	df	Mean square	F value	Level of significance
Scientific attitude	Between groups	9451.024	2	4725.512	16.939	p < 0.05 Significant
	Within groups	313287.84	1123	278.974		

The calculated F value (16.939) for scientific attitude is greater than the critical value 3.00 at 0.05 level of significance with df 2/1123. This implies that the difference in mean scores of



scientific attitude among the three subgroups of higher secondary students based on their group of study is significant at 0.05 level. Hence the above said null hypothesis is rejected. Therefore, it is inferred here that the differences in the scientific attitude might have been influenced by the group of study of students. While comparing the mean scores it is found that students from Mathematics are better than students of Science and students of Computer Science in their scientific attitude.

Major findings of the study

The findings emerged out of the present study are presented below.

1. Regarding level of scientific attitude, it is found that a good majority is at average level in scientific attitude. Therefore it is inferred here that the level of scientific attitude of higher secondary students is '*more of average but not equal*'. This finding support the views expressed in the studies conducted by Dhattrak and Wanjari (2015), Bagavathy and Ramakrishnan (2015) and Barot (2013).
2. This study reveals that there is a significant difference in scientific attitude of higher secondary students with respect to type of school. Moreover it is found that students from girls' schools and co-educational schools are better than students from boys' schools in their scientific attitude. This finding support the views expressed in the studies conducted by James and Marice (2004). The reason may be the hard working and sincere nature of female teachers in their work and other activities.
3. This study reveals that there is no significant difference in scientific attitude of higher secondary students with respect to medium of instruction. Therefore it may be concluded that medium of instruction / language does not bring any significant variation in students' scientific attitude. This finding agrees with Ranganath (2012), but disagrees with the finding of Jancirani, Dhevkrishnan and Devi (2012), where they found that students studying in English medium have higher level of scientific attitude than the students studying in Tamil medium.
4. This study reveals that there is significant difference in scientific attitude of higher secondary students with respect to group of study. Moreover students from the group of Mathematics are better than students of Science and students of Computer Science in their scientific attitude whereas students from Computer Science and students from Science are similar in their scientific attitude. This finding supports the views expressed in the studies conducted by Sekar (2013). This may be due to the comprehending ability and retaining capacity possessed by the students from group of Mathematics.

Conclusion and suggestions

The present study reveals that the scientific attitude of higher secondary students has been average. Here, it is necessary to analyse how it can be developed and promoted more than



the existing level because scientific attitude is necessary to an individual to lead a smooth and comfortable life in the society. It removes the superstition which hinders the progress of an individual. An individual with a high degree of scientific attitude can understand the people in a better way and can contribute to the development of society which, in turn, would lead to the nation's progress.

It is, therefore, recommended that the teachers, educationalists and parents can take some unique step to improve students' scientific attitude. Therefore the following are given as recommendations.

1. Teacher, as a facilitator of the learning, needs to create suitable and conducive learning environment for understanding different concepts and for developing scientific attitude in different learners. Science teachers should adopt scientific attitude. It will enable the students to imbibe the required scientific attitude among themselves. Moreover the teacher has to try to satisfy the curiosity of students and let them know the real facts, processes and concepts. Discuss common superstitions, analyse them and reveal truth about them.

2. Scientific attitudes can be developed among Science students by a purposeful preparation of scientific activities like involving them in scientific discussion and designing an interesting experiment in a novel manner. The use of innovative scientific teaching methods and techniques used to teach Science. Teachers can use various strategies like KWL strategy, PQ4R strategy and ideal strategy to promote and strengthen students' capacity to think (Eggen and Kauchak, 2007).

3. Constructivist philosophy should be adopted in teaching of Science. "Thinking" effectively, with focus on the problem at hand, is an important aspect of constructivist teaching (Khan, 2014). Constructivism is to develop students' critical thinking and scientific attitude

4. In order to awareness among the students regarding scientific attitude, create activities related to scientific attitude can be incorporated in the school curriculum throughout the country. Encourage students to perform experiments themselves and to find out truth. Open ended experiments and activities should be organized to foster scientific attitude. Students should be provided situational-Science experiences every day.

5. 'Awareness of scientific attitude' programme is included in the school curriculum from primary level and also an hour may be allotted, at least, once a week in the time-table for developing awareness of scientific attitude. The scientific attitude can be inculcated among the students by providing them the opportunities for making good adjustments to different situations and to achieve better results.



References

1. Bagavathy, K. & Ramakrishnan, N. (2015). A Study on Science Achievement with Reference to Science Attitude, Locus of Control and Problem Solving Skill among High School Students, *Indian Journal of Applied Research*, 5(1): 119-120.
2. Khan, F. A. (2015), *Biotechnology Fundamentals*, Second Edition, CRC Press, Taylor & Francis Group
3. Sharma, P., & Gore, M. M. (2015). Developing Scientific Temper through School Education. Retrieved from www.academia.edu
4. Ranganath, A. (2014). *A Study Creativity, Scientific Attitude and Attitude towards Science of Prospective Science Teachers of Andhra Pradesh* (Doctoral Thesis, Acharya Nagarjuna University, Guntur). Retrieved from shodhganga.inflibnet.ac.in
5. Sekar, P., & Mani, S. (2013). Science Attitude of Higher Secondary Biology Students, *Indian Journal of Applied Research*, 3(9): 178-179
6. Barot, M. J. (2012). A Study of Intelligence and Creativity among College Students in Relation to Inhabitation and Gender, (Doctoral Thesis, Sardar Patel University, Vallabh Vidyanagar). Retrieved from handle.net
7. Jancirani, R., Dhevkrishnan, R., & Devi, S. (2012). A Study on Scientific Attitude of Adolescence Students in Namakkal District. *International Educational EJournal*, {Quarterly}, 1 (IV): 2-8. Retrieved from www.oijrj.org
8. Dhattrak, G., & Wanjari, S. (2011). A Co-relational Study of Scientific Attitude, Creativity and Scholastic
9. Achievement of Secondary School Students, *Indian Streams Research Journal*, 1(10): 44-47.
10. Husain, A., & Idris, N. (2010). *Dimensions of Education*, Gyan Publishing House, New Delhi.
11. Eggen P., & Kauchak, D. (2007). *Educational Psychology, Windows on Classrooms*. 7th Edition. Upper Saddle River, NJ: Pearson Merrill Prentice Hall Publishing. 202-227.
12. James, J., & Marice, P. V. (2004). A Study on Achievement in Science as related to Scientific Aptitude and
13. Scientific Attitude among 11th Standard Students in Tamil Nadu. *Indian Educational Research and Extension*, 41(2), 16-33
14. Moore, R. W., & Foy, R. L. (1989). The Scientific Attitude Inventory: A Revision. *Journal of Research in Science Teaching*, 34 (4), 327-336.