

SCIENTIFIC ATTITUDE AND ACADEMIC ACHIEVEMENT -A STUDY OF SECONDARY SCHOOL STUDENTS

¹Dr. Sushma Mishra

ABSTRACT --Science has been playing a tremendous role in developing civilization of mankind. Human being is most intelligent creature of nature. Utilizing this intellect only it could reach at this stage of developed world. Only scientific attitude could help human being to reach at this level of development. In the present study an attempt was made to study the academic achievement of secondary school students in relation to their Scientific Attitude. The sample consisted of 520 students (276 girls & 244 boys), selected from 10 different schools of Lucknow city. The main tool used for data collection was Scientific Attitude Scale (SAS) developed by Dr. N.N. Srivastava (for measuring Scientific Attitude). For Academic Achievement, aggregate marks obtained in High School Examination conducted by Uttar Pradesh Board, Prayagraj, was taken as a measure for academic achievement. The result of the study showed that students who were found to possess higher scientific attitude have achieved higher marks in comparison to those who possess lower scientific attitude. Significant differences were observed at the various components of scientific attitude namely Objectivity, Suspended Judgment, and Rationality, Curiosity, Open Mindedness & Aversion to Superstition and various groups of Academic Achievement, according to norms given in the manual. This is indicative of the fact that students having higher Scientific Attitude perform better academically too. Hence measures should be taken to improve Scientific Attitude of students since childhood through formal and informal education. The study is supposed to be beneficial for policy makers, educational planners, principals, teachers, parents and people from community who are directly or indirectly concerned with the development of children.

Keywords--Scientific attitude, academic achievement, secondary school students

I INTRODUCTION

Human beings lived under perpetual fear of natural calamities in ancient times. With the persistent exploration of knowledge they learnt to see order in their lives and surrounding. This path of development adopted by the human beings brought in, sense of chaos and despair in every kind of relationship between man and natural order. Hence, today there is a need to develop the value which helps human being to achieve scientific progress in a manner that people reorient their values and world does not plunge into a state of chaos, by merely using the fruits of scientific progress without any concern for its consequences. This value is commonly referred to as Scientific Attitude. It is presumed that a person having more degree of scientific attitude will be able to perform better in all the fields of life.

¹(M.Sc.-Phy, M.Ed., Ph.D., MBA-HR), Associate Professor, Dept. of B.Ed, Shri Jai Narain Misra P G College, Lucknow, dr.sushma60@gmail.com

1.1 Scientific

As far as the word scientific is concerned, in simplest way we can say that scientific is that which pertains to science and "Science is a way of exploring universe in which we live". Hence in short scientific is anything based on logic, reasoning and cause & effect relationship.

1.2 Attitude

Attitude is considered to be the condition of readiness towards certain objects, acts and situations. Attitudes have been defined as ideas with emotional contents, important beliefs, prejudices, biases, predispositions, appreciations etc. This development of attitudes takes place from very beginning as soon as the child is born. In every action of child there is a formation of attitude of some kind. Studies show that the school is very important factor in shaping the attitudes of children. It is a way of life , thinking process and helps to the better understanding of everything.

1.3 Scientific Attitude

By combining scientific (pertaining to science) and attitude, concept of "Scientific Attitude" emerges, which is considered to be the most important objective in science teaching today. It is a general way of thinking and/or reacting in a manner which involves critical observation, open mindedness, suspended judgment, objectivity, empirical knowledge etc. Scientific attitude helps in better understanding of world we live in. In the present study 6 components of Scientific Attitude are taken as follows:-

- i) Rationality - the quality of being able to think sensibly or logically
- ii) Curiosity - desire for completeness of knowledge
- iii) Open-mindedness - willingness to revise opinions and conclusions logically
- iv) Aversion to Superstition - rejection of superstitious beliefs
- iii) Objectivity- Intellectual honesty
- vi) Suspended judgment - Avoidance of quick judgments and jumps to conclusions

1.4 Academic Achievement

Achievement is what and how much had been learnt or how well a task had been performed, both in school and outside. Academic Achievement is "How much had been learnt and what specific abilities or skills had been developed as a result of particular type of training in the Academic line" i.e. Achievement is individuals' knowledge, understanding or skills in a particular branch of knowledge. According to Freeman by knowing one's Achievements, it is possible to ascertain how much a person knows after receiving education or training in a particular branch of knowledge.

Both Scientific Attitude and Achievement are influenced by surroundings and atmosphere around. Hence, it is a point to study that when children are at their later stage of schooling i.e. at secondary level whether their Academic Achievement is influenced by their Scientific Attitude. Keeping all these points in mind following study was done to achieve some objectives.

II METHODOLOGY

The study was based on survey method because it was solely based on the collected data in the present setting.

2.1 Objectives of the study

1. To compare the Scientific Attitude of students belonging to different Levels of Academic Achievement.
2. To compare various components of Scientific Attitude of the students belonging to different levels of Academic Achievement.

2.2 Hypotheses

For the purpose of the study following null hypotheses were formulated :-

1. There is no significant difference in the Scientific Attitude of the students belonging to different levels of Academic Achievement.
2. There is no significant difference between the students belonging to different levels of Academic Achievement with regard to various components of Scientific Attitude.

2.3 Sampling

For this study stratified proportionate random sampling procedure was used. First of all ten Institutions were selected by lottery method from the list of secondary schools obtained from DIOS office. From this list of Institution 10 Institutions were selected from different areas of Lucknow City. Six hundred students from these Institutions were selected with the help of table of random numbers. Out of these 600 finally 80 had to be dropped as they did not complete the questionnaire. Hence total sample was from 520 students.

2.4 Tools Used

Following tools were used for the purpose of the study.

1. Scientific Attitude Scale (SAS)- constructed by Dr. N.N. Srivastava (1980) to measure the Scientific Attitude of students. It consists of 36 items, 6 items each for six components of Scientific Attitude. Namely 1. Rationality 2. Curiosity 3. Open mindedness 4. Aversion to Superstition, 5. Objectivity 6. Suspended Judgment
2. Percentage of marks in High School (U.P. Board Examination) as a measure of Academic Achievement.

III SCORING AND STATISTICAL TECHNIQUES EMPLOYED

1. The scoring of Scientific Attitude Scale was done as per the instructions given in the manual. Maximum possible score of Scientific Attitude Scale (SAS) was 72. (maximum 2 marks for 36 items) Each component of Scientific Attitude could have maximum score of 12(maximum 2 marks for 6 items).
2. Academic Achievement Scores in the form of aggregate percentage of marks obtained by all students in the high school examination conducted by U.P. Board, Prayagraj

were collected from the schools. Four groups of Academic Achievement were made as follows:-

Serial no of Group	No of students (N)	Level of Achivement	Percentage Range/ Division
1	17	Low Achievers	33- 44.9 /III Div.
2	227	Average Achievers	45-59.9 / II Div.
3	203	High Achievers	60-74.9 / I div
4	73	Very High Achievers	75 and above/ Distinction

Total Scientific Attitude Scores as well as its six components were compared between various groups of Academic Achievement. To study the Scientific Attitude of the students mean and SD's were computed. For comparison between various groups Analysis of Variance (ANOVA) and Critical Ratios were calculated.

IV ANALYSIS OF DATA AND RESULTS

Data was analyzed under following tables-

Table No. 1: Analysis of Scores of Scientific Attitude and its six components with different groups of Academic Achievement.

Scores	Groups	Mean	SD	SE	F-ratio
Total SAS Score	1	46.65	5.07	1.23	24.6595**
	2	50.69	5.40	0.36	
	3	52.98	5.23	0.37	
	4	55.52	4.08	0.48	
Rationality	1	9.47	1.70	0.41	1.3573
	2	9.64	1.88	0.13	
	3	9.89	1.91	0.13	
	4	10.05	1.74	0.20	
Curiosity	1	9.24	2.22	0.54	1.2475
	2	9.62	1.62	0.11	
	3	9.52	1.44	1.10	
	4	9.27	1.25	0.15	
Open-Mindedness	1	6.47	2.18	0.53	6.4613**
	2	7.09	1.97	0.13	
	3	7.40	2.05	0.14	
	4	8.15	1.76	0.21	
Aversion to Superstition	1	7.29	1.26	1.26	0.2185
	2	7.66	1.90	1.90	
	3	7.65	1.99	1.99	
	4	7.70	1.73	1.73	

Objectivity	1	6.29	2.57	0.62	23.3255**
	2	7.71	1.85	0.12	
	3	8.47	1.84	0.13	
	4	9.41	1.63	0.19	
Suspended Judgement	1	7.88	2.12	0.51	34.4634**
	2	8.95	1.90	0.13	
	3	10.04	1.69	0.12	
	4	10.93	1.22	0.14	

* Significant at 0.05 level

** Significant at 0.01 level

Table No. 2 :Individual Comparison by t-test

Groups Compared	CR Value (Total SAS)	CR Value For Components of SAS					
		i	ii	iii	iv	v	vi
1&2	3.12**	0.36	1.04	1.24	0.77	3.07**	2.44**
1&3	4.86**	0.89	0.73	1.87	0.74	4.68**	4.91**
2&3	4.59**	1.40	0.79	1.65	0.06	3.24**	6.48**
1&4	6.39**	1.16	0.09	3.15**	0.76	6.29**	6.49**
2&4	6.96**	1.66	1.75	3.99**	0.15	6.85**	8.43**
3&4	3.62**	0.64	1.17	2.76**	0.19	3.75**	3.73**

4.1 Total Scientific Attitude Score and Academic Achievement

From the tables above it can be concluded that students who possess higher scores of Scientific Attitude were found to have better Academic Achievement. The finding of this study is as per expectation, because the students who are having high degree of Scientific Attitude are more objective, systematic, and critical in their observations and they are open-minded. These qualities help them to show better performance in their studies as well as in examination.

4.2 Rationality and Academic Achievement

Analysis of Rationality component of Scientific Attitude shows that although the mean Scores of rationality for high achievers is on the higher side but this difference is not significant among different groups of achievements. Hence it may be inferred that students belonging to different achievement groups possess almost equal mean score on this component. It may be because in the existing education system still we are giving more and more importance to the acquisition of knowledge and information, instead of developing reasoning ability among students and hence, Rationality is not finding place to play its role in increasing the Academic Achievement of the student.

4.3 Curiosity and Academic Achievement

In case of curiosity also the mean value for all the groups of intelligence was found almost equal. It shows that all the students are moderately curious. It may be because of the wider exposure of students to different media and sources of information.

4.4 Open Mindedness and Academic Achievement

Open mindedness of all the students from all the groups of Academic Achievement in falling under average scale but on the basis of mean value and CR it can be said that very high achievers found to be more open minded in comparison to other three groups of achievements. Open minded person is always willing to release opinions and conclusions and he desires for new thinking and ideas, which definitely help him in higher achievement.

4.5 Aversion to Superstitions and Academic Achievement

Analysis of Aversion to Superstition component of Scientific Attitude reveals that different groups of achievement do not differ significantly with each other on this component. This indicates that Aversion to Superstition does not help much in higher achievement. Today in this scientific world superstitious beliefs have no place, but at the same time it is also true that we are not completely free from superstition and almost every person believe in some sort of superstitions knowingly or unknowingly. Hence, this factor could not emerge as an important factor which could decide the achievement of the students.

4.6 Objectivity and Academic Achievement

Significant differences were found among various groups of achievements with regard to objectivity component of Scientific Attitude. This shows that objectivity plays a significant role in the achievement of the students. More objective students have greater possible concern for observing and recognizing facts without any influences of personal pride, biases and prejudices, which helps them in scoring higher marks in their examinations. This finding is quite natural as intellectual honesty largely has positive influence on Academic Achievement of the person.

4.7 Suspended Judgment and Academic Achievement

Analysis of Suspended Judgment component of Scientific Attitude reveals that on this components significant differences were observed among each pair of group of achievement. This shows that high achievers do not take decisions in lack of any evidence as compare to low achievers. They judge any thing after getting concrete evidence in support of their judgment. It is a well know fact that anything judged after a thorough analysis, taking into consideration every fact and possibility, only yields to correct judgment. This tendency helps the students in securing better Academic Achievement also.

V RESULTS

Main finding of the study are:

1. Students who have achieved high marks are found to possess higher Scientific Attitude in Comparison to those students who have achieved low marks.
2. High achievers have scored high mean value of total SAS and on all the six components of Scientific Attitude.
3. In case of Open-Mindedness, Objectivity and Suspended Judgment components of Scientific Attitude, difference in mean was significant. While on component of Curiosity, Aversion to Superstition and Rationality the significant difference is not observed in either of the group.

VI CONCLUSIONS

Though statistically significant differences in Scientific Attitude of students were observed between various groups of Academic Achievement, Yet it is very interesting to note that Scientific Attitude scores of secondary school students mostly fell under average category. Which mean most of the student possess moderate Scientific Attitude and only a few students are found to possess high Scientific Attitude. This finding is indicative of the fact that Education which is being imparted in our educational institutions is not able to inculcate desirable Scientific Attitude among students. Hence special efforts are needed to improve the situation. More traditional and superstitious atmosphere in the families and community may also be a cause for not developing proper scientific Attitude in teenagers.

The teachers, teacher educators, policy makers and educational researchers should pay a due attention to this fact. In fact teachers should be aware of their own Scientific Attitude and try to develop various characteristics associated with Scientific Attitude through their day to day teaching and by setting good examples. Similarly, the teacher educator should try to develop Scientific Attitude in their prospective teachers and train them in various methods of developing Scientific Attitude in the student. The curriculum should have contents related to the concept and importance of Scientific Attitude at various levels. It should also include various activities related to the development of Scientific Attitude. Like wise educational researchers should try to find out the weaknesses in the curriculum and should also suggest remedial measures.

REFERENCES

1. Anastasi A, (1982) -"Psychological Testing", New York: Mac Millian Publishing Co. Inc.
2. Bhatia &Bhatia,(1992)- "The Principles and Methods of Teaching", New Delhi: DoabaHouse .
3. Buch M.B., (ed) (1987) "Third Survey of Research in Educational " New Delhi" N.C.E.R.T.
4. Dani D.N. (1989)- "Scientific Attitude and Cognitive Styles", New Delhi: Northern Book Centre.
5. Dubey L.N. &Ghai,(1993) - "Scientific Attitude Among Teachers of Different Disciplines," *Bhartiya Shiksha ShodhPatrika*, Vol. 12, No. 2, July Dec.
6. Krishna D. G.(1975) - "A study of Scientific Attitude and its Relation to Intelligence of Graduate Students," unpublished M.Ed., Dissertation Andhra University.
7. Rao D.B. (1997) - "Reflection on Scientific Attitude" New Delhi: Discovery Publishing House .

8. Rao D. B. (2010) - "Scientific Attitude, Scientific Aptitude And Achievement" New Delhi: Discovery Publishing House .
9. Russel Bertrand,(1959) - "The Impact of Science on Society, London George Allen & Unwin Ltd.
10. Srivastava N.N.(1975) - " A study of Scientific Attitude and its measurement," Ph.D. Education, Patna University.
11. Vaidya J. Sagar, (2003) - "Scientific Attitude and Higher Education" New delhi: Anmol Publicationa Pvt. Ltd. Publisher & Distributer .
12. Vaidya Narendra,(1998) - "How to think Scientifically" New Delhi: Deep & Deep Publication Pvt. Ltd.
13. Vaidya Narendra (1976) - "The impact Science Teaching," New Delhi: Oxford and IBH Publication Co. 1976.
14. Waddington C.M.(1948) - "Scientific Attitudde", Penguin Books, West Droyoton: Middles Sex.
15. M.NAVIN KUMAR, A.S.DEVIKA, K.HARI KRISHNAN, S.JANE SELCIA. "SYMMETRIC STACKING BINARY COUNTER." International Journal of Communication and Computer Technologies 7 (2019), 11-18. doi:10.31838/ijccts/07.SP01.03
16. Prakash, R., Caponigro, M. Inner light perception as a quantum phenomenon-addressing the questions of physical and critical realisms, information and reduction (2009) NeuroQuantology, 7 (1), pp. 188-197.
17. Persinger, M.A., Meli, S., Koren, S. Quantitative discrepancy in cerebral hemispheric temperature associated with "Two consciousnesses" is predicted by Neuroquantum relations (2008) NeuroQuantology, 6 (4), pp. 369-378.