# EFFECTIVENESS OF INQUIRY TRAINING MODEL OF TEACHING ON SCIENTIFIC ATTITUDE OF IX STANDARD STUDENTS

[1] **Lokesh T.N.**, [2] **Dr. Umme Kulsum**

[1] Research Scholar, [2] Professor of Education
[1] Department of Education
[1] Bangalore University, Jnana Bharathi, Bengaluru 560 056, Karnataka, India.

***Abstract:*** The objective of the study is to compare the scientific attitude scores of students taught through inquiry based method and those taught using lecture method. The study adopted a pre test, post test, control group, quasi experimental research design. The population of the study comprises of IX standard students of Government High School, Chikkabidarakallu, Nelamangala Road, Bengaluru, Karnataka, India. The total of forty IX grade students from co-educational state secondary school from two classes of a general science course taught by the same teacher selected as sample of the study. These students were randomly assigned to two groups (treatment and control) groups. Scientific Attitude Scale was developed by Dr. Smt. Shailaja Bhagwat (2006). The inquiry based method was used by the experiment group whereas the lecture method was used for the control group. Different statistical tools such as mean, standard deviation and t-test were applied to calculate difference between the two groups. Statistical Package for Social Sciences (SPSS) was used for data analysis. Based on the findings it was concluded that inquiry based method enhances effective understanding and skill development; therefore it should be used in teaching secondary school students. The use of inquiry training model should be given emphasis in the curriculum of pre-service teachers of science teachers especially science teachers. There should be proper provisions of facilities which are necessary for effective inquiring strategies. Teacher should train the students to transfer their learning to daily life situations and should relate science to other disciplines through inquiry training model.

***Index Terms*** - Effectiveness, Inquiry Training Model, Scientific Attitude, IX Standard Students

## I. INTRODUCTION

Science forms an integral part of learning. Essentially it has to be learnt mainly through concrete situations related to immediate environment. The main focus of imparting science education is on sharpening the senses of the learners and encouraging them to discover, observe and explore their environment and surroundings. This would generate curiosity and would enhance awareness and understanding. According to Singh (1995) "Whenever we are in a process of finding out or investigating through questions, we are in the process of inquiry. From a simple array of questions, if the inquiry takes the form of disciplined and systematic approach, it becomes the spirit of scientific method". Therefore training the learners for investigating and explaining ant type of puzzling problem, phenomena or event can be a way of orienting their minds towards scientific inquiry. There are various methods and models of teaching through which learners can be taught science through the process of inquiry.

An important purpose of science teaching in general education up to secondary stage is to familiarize the learners with various dimensions of scientific literacy. Scientific attitude, a very important attitude should be developed in the children who are the future citizens, if the objectives of teaching science are to be achieved. Science teaching through the use of models of information processing family is to help the students become more powerful learners.

Hannasari; Harahap and Sinulingga (2017) found that science process skills of students who are taught by the model of scientific inquiry using concept maps was better than conventional learning. Sen and Vekli (2016) found positive influences of inquiry-based teaching approach on pre-service science teachers' laboratory self-efficacy perceptions and scientific process skills was observed. Niana; Sarwanto and Ekawati (2016) found that the application of guided inquiry model on Physic learning can improve students' scientific attitude. Harahap et al. (2016) establish the results showed that science process skills that students are taught by inquiry training model better than students who use conventional learning. Choudhary (2016) explored that inquiry based instruction had positive impact for the improvement of student's attitude towards physics. Maxwell and Lambeth (2015) found that students who received Inquiry based learning instruction showed a slight statistically insignificant decrease in their positive attitudes towards science. Ergul et al. (2011) results of the study showed that use of inquiry based teaching methods significantly enhances students' scientific attitudes. Simesek and Kabapinar (2010) findings indicated that Inquiry based learning (IBL) had a positive impact on students' conceptual understanding and scientific process skills, but did not make any difference on their attitudes towards science. Mao and Chang (1998) found that the inquiry-oriented instructional method developed significantly more positive attitudes toward Earth science than did those in the control group.

From the above studies it was observed that scientific attitude is one of the form of intelligence that is owned by every individual. Students' scientific attitudes in learning can affect student learning outcomes. Student's scientific attitude is basically no different from other skills (cognitive, social, process, and psychomotor). To bring up the scientific attitude of students also required a model of learning in accordance with the indicators held by the students' scientific attitude.

**1.1 Statement of the Problem:** The problem is how inquiry method of teaching can improve scientific attitudes of IX standard students.

**1.2 Purpose of the Study:** The objective of the study is to compare the mean scores of scientific attitudes of IX standard students taught through inquiry based method and those taught using lecture method.

**1.3** **Hypothesis:** There is no significant difference between the Scientific Attitude of students taught Biology subject using inquiry training model of teaching and those taught with traditional teaching method.

## II. METHODOLOGY AND PROCEDURE

**2.1** **Design:** The study adopted a pre test, post test, control group, quasi experimental research design. This design was adopted because the subjects were not randomized**.**

**2.2** **Population:** The population of the study comprises of IX standard students of Government High School, Chikkabidarakallu, Nelamangala Road, Bengaluru, Karnataka, India

**2.3** **Sample:** The total of forty IX grade students from co-educational state secondary school from two classes of a general science course taught by the same teacher selected as sample of the study. These students were randomly assigned to two groups (treatment and control) groups.

**2.4** **Instrument:** Scientific Attitude Scale was developed by Dr. Smt. Shailaja Bhagwat (2006). This scale consists 24 items. Out of 24 items 12 items are positive and 12 items are negative. Each item followed by five alternatives-Strongly Agree (S.A.), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (S.D.). Test-retest reliability and split-half reliability of this test were found 0.94 and 0.87 respectively. Correlation between Scientific Attitude Scale and Superstitious Attitude Scale of Bhagwat (1995) was found -0.86 which support accuracy of the scale content validity.

**2.5** **Experimental procedure:** The inquiry based method was used by the experiment group whereas the lecture method was used for the control group. The topics were taught for a total of ten periods of 40 minutes each per group.

**2.6** **Statistical Procedure:** The data was analyzed and tabulated for interpretation and presentation of data. Different statistical tools such as mean, standard deviation and t-test were applied to calculate difference between the two groups. Statistical Package for Social Sciences (SPSS) was used for data analysis.

## III. RESULTS AND DISCUSSION

**Table-1:** Comparison of pre test mean scores scientific attitude of control and experimental groups.

| Learning domain | Group | Mean Scores | Standard Deviation | Obtained t Value | Level of Sig. | P |
|---|---|---|---|---|---|---|
| Scientific Attitude | Control | 76.450 | 5.548 | 1.73 | Not Significant | 0.783 |
| | Experimental | 79.300 | 4.846 | | | |

Table at 0.05 level of significance :2.09; df=19

From the table-1, it was observed that the pre test mean scientific attitude scores of experimental group was almost equal to the means score of control group. The calculated value of 't' was less than the tabulated value of t test value that is 1.73<2.09. Therefore, there was no significant difference between the mean scores of experimental and control group on pre test of scientific attitude scores. It shows that the scientific attitude of both groups was almost equal prior to the treatment.

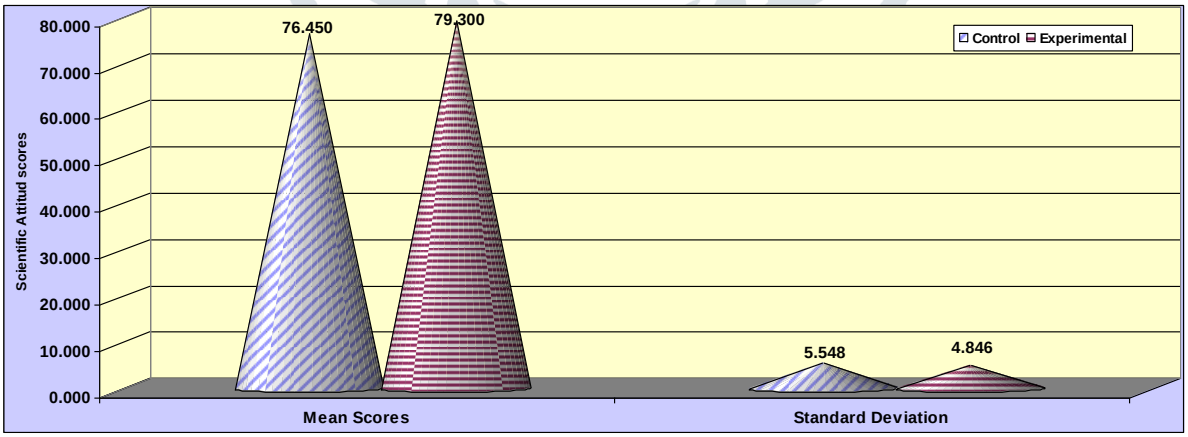


**Fig 1:** Comparison of Pre test Mean scores of Scientific Attitude between control and experimental groups.

**Table-2:** Comparison of post test mean scores of scientific attitude of control and experimental groups.

| Learning domain | Group | Mean Scores | Standard Deviation | Obtained t Value | Level of Sig. | P |
|---|---|---|---|---|---|---|
| Scientific Attitude | Control | 73.050 | 6.253 | 18.48 | Significant at 0.01 level | 0.000 |
| | Experimental | 111.200 | 6.786 | | | |

Table at 0.01 level of significance: 2.88; df=19

From the table-2 it was seen that the post test mean scores of scientific attitude of experimental group. The calculated value of 't' test is greater than the tabulated value of 't' test that 18.48>2.88. The 't' value shows significant difference between the mean scores of both the groups on post test scores. It shows that both groups were not equal regarding scientific attitude and as the performance of experiment group had been improved a result of treatment of inquiry training.

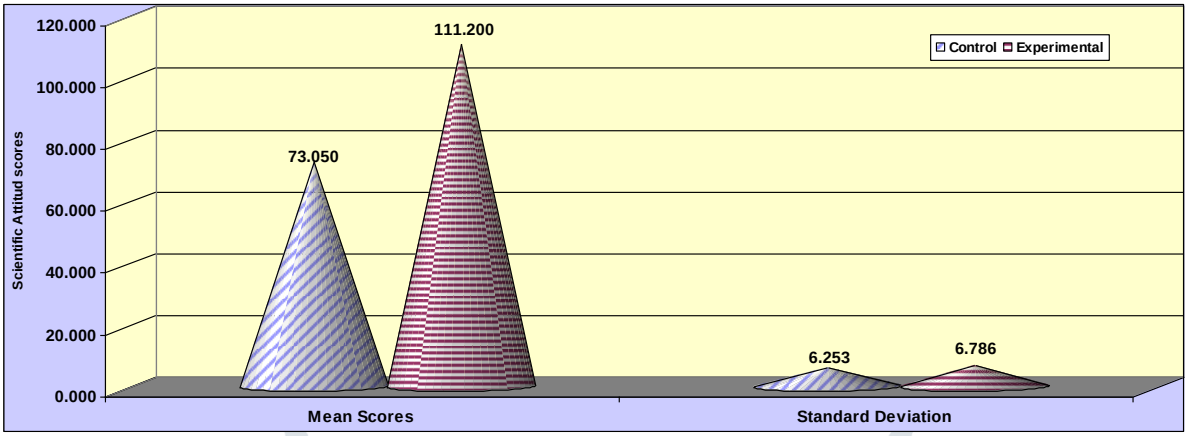


**Fig-2:** Comparison of Post test Mean scores of Scientific Attitude between control and experimental groups.

## IV. DISCUSSION OF RESULTS

The findings of the study revealed that inquiry training model of teaching has a significant effect on students' scientific attitude. The findings are in line with Niana; Sarwanto and Ekawati (2016); Choudhary (2016); Ergul et al. (2011); Simesek and Kabapinar (2010); and Mao and Chang (1998) found that the application of varied inquiry model on science learning can improve students' scientific attitudes and contrary result by Maxwell and Lambeth (2015) found that students who received Inquiry based learning instruction showed a slight statistically insignificant decrease in their positive attitudes towards science.

## V. CONCLUSION

Based on the findings it was concluded that inquiry based method develop positive scientific attitudes; therefore it should be used in teaching secondary school students. The use of inquiry training model should be given emphasis in the curriculum of pre-service teachers of science teachers especially biology teachers. There should be proper provisions of facilities which are necessary for effective inquiring strategies. Teacher should train the students to transfer their learning to daily life situations and should relate science to other disciplines through inquiry training model.

**REFERENCES**

[1] Choudhary, Farkhunda Rasheed (2016). Effect of Inquiry Based Instruction on Student's Attitude and Academic Achievement in Physics. *Sci.Int.* (Lahore), *28*(4), 91-94.

[2] Ergul, Remziye; Simsekli, Yeter; Calis, Sevgul; Cocmencelebi, Zehra Ozdilek Sirin and Sanli, Meral (2011). The Effects of Inquiry-Based Science Teaching on Elementary School Students' Science Process Skills and Science Attitudes. *Bulgarian Journal of Science and Education Policy*, *5*(1), 48-68.

[3] Hannasari, Rinapril; Harahap, Mara Bangun and Sinulingga, Karya (2017). Effect of Scientific Inquiry Learning Model Using Scientific Concepts Map and Attitudes to Skills Process Science Students. *Journal of Education and Practice*, *8*(21), 48-52. www.iiste.org

[4] Harahap, Mara B.; Manurung, Sondang R.; Marbun, Mas A.; and Mihardi, Satria (2016). Effect Model Inquiry Training on Student's Science Process Skill. *Advances in Social Sciences Research Journal*, *3*(11), 38-42.

[5] Mao, Song-Ling and Chang, Chun-Yen (1998). Impacts of an Inquiry Teaching Method on Earth Science Students' Learning Outcomes and Attitudes at the Secondary School Level. *Proc. Natl. Sci. Counc. ROC(D)*, *8*(3), 93-101.

[6] Maxwell, Deborah O. and Lambeth, Dawn T. (2015). Effects of using inquiry-based learning on science achievement for fifth-grade students. *Asia-Pacific Forum on Science Learning and Teaching*, *16*(1), Article 2, 1.

[7] Niana, Rulita; Sarwanto; and Ekawati, Elvin Yusliana (2016). The Application of Guided Inquiry Model on Physic Learning to Improve Scientific Attitude and Students' Analysis Ability. *Proceeding the 2nd International Conference* on Teacher Training and Education Sebelas Maret University, *2*(1), 605-615.

[8] Sen, Ceylan and Vekli, Gulsah Sezen (2016). The Impact of Inquiry Based Instruction on Science Process Skills and Self-efficacy Perceptions of Pre-service Science Teachers at a University Level Biology Laboratory. *Universal Journal of Educational Research*, *4*(3), 603-612. http://www.hrpub.org

[9] Simesek, Pinar and Kabapinar, Filiz (2010). The Effects of Inquiry-based Learning on Elementary Students' Conceptual Understanding of Matter, Scientific Process Skills and Science Attitudes. *Procedia Social and Behavioral Sciences*, *2*, 1190-1194.

[10] Singh, L.C. (1995). Inquiry Training Model: Teaching Problem Solving through Discovery and Questioning. In L.C. Singh (Ed). Multiple Models of Teaching for Educators. New Delhi: Vikas Publishing House Pvt. Ltd.