

# COMPREHENSION OF VIII STANDARD STUDENTS IN 'SCIENCE AND TECHNOLOGY' SUBJECT IN SCHOOLS OF VADODARA CITY

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**Abstract:** Science has been accepted as a foundation of advanced technology and for understanding of nature. It is well accepted fact that scientific methodology could enhance mode of thinking and way of life. This nature of science and technology must get reflected in the teaching of science. Unfortunately, the schools are unable to satisfactorily fulfil the objectives of teaching science and technology. IT has been reported by National Focus Group on teaching of Science (2006) "though activity-based teaching has been accepted as a paradigm for science education and is also reflected in some measure in the textbooks developed at the national and state levels, it has hardly been translated to actual classroom practice". Present piece of research work is intending to research in the area of science comprehension of students on certain concepts. It aimed to find out through chemistry concepts that whether students really understand the concepts or merely memorising and getting the marks out of it. It further analyse the result qualitatively to reach out to the root cause of misconceptions.

**KEYWORDS:** Science Comprehension, Chemistry, activity based teaching, science education

## INTRODUCTION

Today's age is the age of Science and Technology. Right from cradle to grave all our activities are controlled and fashioned by science. Science has entered in our life and daily activities so much that our existence would become impossible without it. Science is important in everyone's life whether one knows it or not but is directly affected by it. Hence to avoid knowledge and understanding of science is to give up the right to make knowledgeable decisions about science and therefore about one's life in a society that is deeply affected by science. The purpose of science education is to develop scientific literacy which is a high priority for all citizens, helping them to be interested in, and understand the world around them, to engage in the discourses of and about science, to be sceptical and questioning of claims made by others about scientific matters, to be able to identify questions and draw evidence-based conclusions, and to make informed decisions about the environment and their own health and well-being. This being the situation it becomes very important that all the primary school children not only be aware about the basic concepts of science but possess thorough understanding of concepts, principles, facts and theories of science.

The rapid advancement of science and technology and increasing need for scientist and technologists have made it all the more important to provide for science base education in the school. The primary school days are the foundation for further study and therefore vigorous methods and approaches for cultivation and promotion of Science should be adopted. In the world of today where knowledge is being multiplied exponentially, science education will not be able to justify itself by remaining merely contented with the objective of imparting a certain quantum of scientific knowledge, however large be the quantum. Since the rate at which knowledge gets obsolete is very high and therefore it is essential that the emphasis of science education should be on the development of abilities and disposition of mind rather than merely the transfer of dead subject matter. Thus science education if properly conceived should primarily be concerned with the education of mind rather than acquisition of isolated pieces of scientific knowledge. The curriculum must enable students to put their views, to ask questions and to do mistakes learn from those mistakes and to pursue investigation, share their experience with school knowledge and relate it with world outside instead of ability to reproduce textual knowledge.

Umashree (1999), found that of classroom observation of 240 lessons in secondary science in 185 cases (seventy-seven percentage) the lesson was introduced by simply writing the topic on the blackboard and recounting the previous days' lesson. Eighty percentage of the classes observed revealed the fact that the students participated only as a passive listener. The student participation if any was limited to seeking clarification on the teaching point. The teachers also felt that when it comes to examination, the students are expected to reproduce some sections of scientific information contained in the textbook, and hence they did not see the essentiality of conducting discussion sessions or participatory sessions. Even Malhotra (2006) holds similar views stating that "teachers often provide lecture and students largely observe the teacher rather than actively participating in the classroom". Various Committees and Commissions have recommended for improving the quality of science teaching by moving away from behaviourist, teacher centred approach to constructivist student centred approach.

As per recommendation of various commissions and committees and specially focusing to the recommendation of NCF (2005), Gujarat State Board of school textbooks has revised textbook for standard V, VI and VII where in there is scope of incorporating

many activities which would help to enhance the understanding of students in the subject. The revised textbook for standard VII is implemented from the academic year 2008-2009. Though there is change in the school textbook what kind of approach, method, media, teaching aid are used by teachers is a question to ponder upon. Eight standards is the terminal class for elementary education.

Shelat (2013) found that at the age of eleven to thirteen students are in concrete operational stage and students of this age exhibit thinking in system rather than single bits of knowledge. Thinking is characterized by inductive and deductive approaches in reasoning and solving problems. If students at this age are served with appropriate mental food with proper instructional strategy, they may show marked level of difference in concrete operational stage which in turn may prove helpful to accomplish the task of formal operational stage characterized by hypothetical thinking and contemplate the solution based on creativity and abstract thinking. The students have already learnt certain scientific principles over a period of six years of their elementary education which may have helped them in constructing certain concepts. Students are able to visualize and directly experience the immediate applicability, of many of concepts that they learn in science in their day to day life and surroundings. This allows them for better scope of constructing their own knowledge and understanding about many of the events, phenomenon which they observe in the environment. There is a dire need felt to find out what students think about science, what is their comprehension about different scientific principles, facts and theories. Primary stage students are at the level of formation of basic concepts and therefore if the comprehension of students about science is found and accordingly strategy is developed that the comprehension of students is strengthened then that would prove to be excellent help as the primary education is the base for secondary and higher education too. Investigator has completed her study on chemistry subjects so that she will be focused on the chapter of textbook which was related to chemistry. In higher standard students feel that chemistry is very hard subject because of chemical reactions, different functional group etc concepts are not able to understand so that investigator takes this topic to find out comprehension in student of eight standards. Eight standards is transition stage between primary and higher education. If in primary standard students clear their concepts, then they do able to understand chemistry in higher standard.

### RESEARCH GAPE

Most of the studies which the researcher could come across have focused on secondary level and higher secondary level that too confined to see the relationship between different variables, rather than probing into the understanding and development of skills in the student. It is observed from the findings of the studies reviewed that use of inquiry-based, practical based teaching can enhance the learning in students. Review reveals that the understanding of science was less in the students so that investigator will take this study to find out comprehension in eight standard students.

### TITLE OF THE STUDY

Comprehension of VIII standard students in 'Science and Technology' subject in schools of Vadodara city

### OBJECTIVES OF THE STUDY

1. To study the comprehension of standard VIII students in the subject 'Science and Technology'.
2. To identify the misconceptions in the select concepts of standard VIII students in the subject 'Science and Technology'.

### EXPLANATION OF THE TERM

**Comprehension in science:** Comprehension in science means understanding of students in science as a whole covering both the aspects of science, the process aspect of science as well as the product aspect of science.

### OPERATIONALISATION OF THE TERM

- **Comprehension in science:** Comprehension for the present study Comprehension in science refers to students understanding about the selected science concepts as reflected through Questionnaire.
- **Misconception in science:** Misconception for the present study refers to the non- comprehension/ false comprehension of the students about the selected science concepts because of that they could not attempt the question correctly.

### DELIMITATION OF THE STUDY

The study is delimited to standard VIII students of English medium schools affiliated to Gujarat Secondary and Higher Secondary Education Board (GSHSEB) in Vadodara city. The study is also delimited to chapters having chemistry concepts; Element & Compound, chemical & physical change, Reversible & Irreversible reaction, Acid & Base and Separation Techniques.

### RESEARCH DESIGN

As per the objective of the study, descriptive survey method is adopted for the present study. The study attempted to know the science comprehension among VIII standard students.

### POPULATION

The population for the study comprised of approximately 2600 students of 65 English medium schools of eight standards in Vadodara city.

### SAMPLE

As per the demand of the study Random sampling technique was used and 12 English medium schools were selected randomly using lottery method. From all the selected schools all the students of VIII grade comprises the sample for the study. Where more than one division is there any one division was selected. Thus the final number of the sample from which the data is received was 352 students.

## TOOLS AND TECHNIQUES

In order to collect the requisite data for theme of research, one had to devise appropriate tools and use suitable measuring technique and sample drawn here, for the study investigator prepared questionnaire for identify the Comprehension in students. Questionnaire should be given to the students (based on basic concepts) containing both open ended and closed ended questions. From these questions investigator had to know the comprehension in students.

### Questionnaire to assess science comprehension of students

Based on the objectives and the nature of data required investigator prepared the questionnaire. Questionnaire had both open ended and closed ended. Investigator analysed the textbook of Fifth, Sixth and seventh standards and found the chapters of chemistry then investigator found four concepts such as element and compound, physical change or chemical change and reversible or irreversible change, acid and base, separation techniques. Investigator identified basic concepts of chemistry which are considered as core concepts for eight standards. The first draft annexure 4 questionnaires were developed by the investigator keeping in mind these concepts. After making questionnaire investigator has given it to the experts for the validation. Both content and language aspect were taken care of. After incorporating suggestion given by experts second draft of questionnaire was prepared. Thus modified questionnaire was ready for implementation. Item wise distribution of the concepts is given in the table which was given below no.3.1

**Table number 3.1 Concepts Wise Distribution of Marks**

Question number	Concepts	Distribution of marks	Number of items	Marks
1 (A)	Elements and Compound	Per item 1 mark.	5	5
1 (B)	Elements and Compound	Per item 0.5 marks.	10	5
2	Physical properties	Per item 1 mark.	15	15
3	Acid, Base and Salt	Per item 1 mark.	10	10
4	Separation Technique	Per item 1 mark.	15	15

## DATA COLLECTION

Data collected by investigator through questionnaire from different schools, during the academic year 2014-2015. Here investigator approaches the VIII standard students with prior permission from the authorities. After taken permission investigator herself went to school and given questionnaire to the students. After questionnaire were filled by students' investigator collected the data.

## DATA ANALYSIS

The collected data analysed qualitatively or quantitatively. Qualitatively data once collected will be voluminous, so the first step organized the data in the second step, the investigator decoding the data according to view point of participant and finally the data interpreted into an analytic framework. In data analysis investigator first analyzed achievement test of students then found percentage of particular concepts then analyzed the concepts and misconceptions of concepts respectively with graphs. Then investigator analyzed each concepts and each question of concepts and made interpretation and misconceptions. Quantitative data will be analyzed using frequency and percentage and made graphs of each concepts. Qualitative data were analyzed by interpretation and misconceptions.

## MAJOR FINDINGS

### A. Finding related to comprehension of the concepts

- Mean score of students on comprehension of different concepts was 29.14 whereas the median and mode is 29 and 26 respectively. The maximum possible score on the test was 45 and minimum score was 5. This means that the average performance of the students on comprehension is 29.14.
- 81% students were writing the formula of given substances and identified whether it was elements and compounds.
- 60.51% students were written the formula and identified the given substances has how many element was presents.
- 64.4% students were identified the properties like physical or chemical change and reversible or irreversible reaction with reason of given substance.
- 51.70% students were identified the nature of the substance like acidic, basic or neutral.
- 55.68% students were identified the given separation techniques and their examples.

### B. Major Finding related to non-comprehension of the concepts

- Most of the formula can be written by initial of name like oxygen (O) nitrogen (N), but it is not same for all the substances. Here also two atoms can be joined and make molecule so we can write (O<sub>2</sub>) and (N<sub>2</sub>).
- It was found that most of the students didn't identify the formula of sugar. Because they haven't known that we have to write formula of glucose only.
- Students didn't know the symbol of elements so that they didn't write the correct formula and the substance which was given in the textbook they wrote correctly but if we done slightly change in the substances they didn't wrote the formula.
- Students didn't give correct responses because they didn't comprehend the concepts that substance has changed the state as well as constitutes, melting means constituents change in the candle. They didn't comprehend that melting and burning is two different phenomena, breaking a glass is seen by naked eyes and when it was broken then never made again, adding a salt in particular solvent made new compound and their constitutes also change. In that evaporation concepts also came so that it was reversible reaction and freezing an ice it was only change the state not constitutes.
- Most of the students didn't understand the concepts of colour change of litmus paper, wrote that colour change of red to blue means Acidic in nature and colour change of Blue to Red means Basic in nature which was incorrect, Salt has neutral in nature so no colour change has seen in the given litmus paper they didn't understand and student wrote the colour change but not write the correct reasons.
- Most of the students have not identified the churning technique, Some of the students were identified but they wrote incorrect spelling of churning, winnowing and sieving, Students didn't know the examples of given technique and from the picture they didn't identified the exact technique name but wrote examples.

Students learn the concept for the exam only they cannot understand the application of the concept. From the non-comprehension we can see that students done lots of mistake because of this problem only. Arons (1983) understanding science concept takes time; one cannot assimilate the abstract concepts and modes of thought that characterize scientific thinking through quick memorization. The present study found that 50% of the students comprehended the concepts but 50% students didn't comprehend the concepts because of some misunderstanding or misconception in students.

### CONCLUSION:

Science in classroom is a dynamic field. When taught as active investigation it can be meaningful and stimulating for the students and teacher as well. The students will comprehend science and thus will be able to apply it in the day to day life situations. So that students develop the concepts very well. Science teaching cannot have confined itself to the classroom but should relate with the child's age range and local environment in which child can practice what he has learnt in the classroom. This study was an attempt to study the existing status of the science comprehension on select concept of grade VIII students. It paved ways towards entering into the realisation of the learning rather than evaluating teaching and studying the marks. Every child has its own world of understanding. Teacher has to ensure the comprehension in the related subject be it science, language or social science.

### BIBLIOGRAPHY

- Amin, J. A. (2011). Development and Implementation of an Activity Based Science Teaching Programme for Pre-Service Student Teachers. An Unpublished Ph.D. Thesis, The Maharaja Sayajirao University of Baroda, Vadodara.
- Arons, A. (1983). Achieving Wider Scientific Literacy. *Daedalus*, Spring, pp 91-122. In Raizen, S. A. and Michelsohn, A. M. (1994). *The Future of Science in Elementary Schools Educating Prospective Teachers*. San Francisco: Jossey-Bass Publisher. K.
- Barrentine, C. B. (1986). Science Education: Education in, or About Science? *Science Education*, Vol. 70, No.3, 497-499
- Mohapatra, J. K. & Mahapatra, M. (1999) *New Dimensions of Science Curriculum An Operational Approach*. New Delhi: Commonwealth Publishers.
- Berg, C. (2010). Teaching for Conceptual Change: An Intervention to Promote Deeper Understanding of Diffusion and Osmosis. *Arizona State University in Dissertation Abstract International*, Vol. 71, No.11, May 2011.
- Chunawala, S. (2006). Research in Science Education Trend Report. Sixth Survey of Research in Education. New Delhi: NCERT.
- Diane, J. (2006). Students' Development of Astronomy Concepts across Time in *Dissertation Abstract International* Vol. 67, No.10 pp.3763 April, 2007.
- Fitzpatrick, F. C. (1960). *Policies for Science Education*, New York: Bureau of Publication, Teachers College, Columbia University.
- Gail, M. (2006). Understanding in Secondary School Science: An Interpretive Study In *Dissertation Abstract International* Vol. 68, No.9 pp. 3788, March 2008.
- Hornby, A. S. (1974). *Oxford Advanced Learners Dictionary of Current English*. London: Oxford University Press.
- Indian National Science Academy (2002). A Brief Report on seminar on Science Education Programme: Trends and Future Initiatives. Retrieved from <http://www.interacademies.net/cms>
- Jung, P. (2006). Student Perception and Conceptual Development as Represented by Student Mental Models of Atomic Structure in *Dissertation Abstract International* Vol. 67, No.7 pp2517 January 2007.
- Kenyon, L. O (2003). The Effect of Explicit, Inquiry Instruction on Freshman College Science Majors' Understanding of the Nature of Science. University of Houston, in *Dissertation Abstract International* Vol. 64, No.2, pp 448, August, 2003.
- Lee, T. R. (2010). Young Children's Conception of Science and Scientists. University of Washington in *Dissertation Abstract International*, Vol. 71, No. 10, April 2011.
- Malhotra, V. (2006). *Methods of Teaching Physics*. New Delhi: Crescent Publishing Corporation.
- NCERT (2000). *National Curriculum Framework for School Education*. New Delhi:

NCERT (2006). Position Paper National Focus Group on Teaching of Science. New Delhi:

Shelet, P. (2010) Developing an instructional strategy and studying its effectiveness for comprehension in science among class VII students. The Maharaja University Vadodara.

Umashree, P.S. (1999). Science Curriculum and its Transaction: An Exploratory Study in Secondary Schools of Vadodara, Gujarat. An Unpublished Ph.D. Thesis, The Maharaja Sayajirao University of Baroda, Vadodara.

Vaidya, N. (1997). Research in Science Education Trend Report. in Sharma, J. P. (Ed. 1997). Fifth Survey of Educational Research. New Delhi: NCERT.

