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CHAPTER: 1
INTRODUCTION OF THE RESEARCH

1.1 INTRODUCTION:

Constructivist view of teaching and learning originated from core question of what constitutes reality debated from last century by philosophers and scientists. The traditional epistemological paradigm emphasized on objective view of reality which states that reality exist outside the individual and can be discovered and taught to learners by language or other representation. By the efforts and researches of some famous psychologists such as Jean Piaget, Lev Vigovtsky, Earnest von Glessersfield, John Dewey the ancient paradigm about reality changed from objective to subjective reality.

According to Jean Piaget knowledge cannot be transmitted intact from one person to another; people must construct their own knowledge and understanding from their daily experiences by reflecting and reconstructing them. Learning can not be occurring by transmitting information from teacher to student. Real learning occurs from authentic experiencing event or subject matter. To reinforce his view, Jean Piaget gave mechanism of constructing knowledge by giving stages of cognitive development.

Constructivism emphasizes the careful study of the processes by which children create and develop their ideas. Teachers might help make this connection by asking reflective questions such as,

- How does this idea fit with what you already know?
- In what way is this problem like other problem/situations you are experienced?
- What is about this problem that reminds of from previous problem?

According to constructivist view of learning there should be balanced focus on the individual learner, the learning process and the learning context. It is an approach in which the learner is building an internal illustration of knowledge, a personal interpretation of experience. It is active, constructive, cumulative, goal directed, diagnostic and reflective.

According to Jean Piaget the networks or "Cognitive schemas" that exist in the learner's mind are the principal determining factors for how an idea will be constructed. These networks are the products of both constructing knowledge and developing concepts. Constructivism concentrates on learning how to think and understand. It initiates student directed learning. Students are able to clearly cognize the principles they have learnt and
carry the new knowledge to real life. It also provides realistic learning activities that initiate curiosity and prompt students to formulate their own questions.

In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. Constructivism does not dismiss the active role of the teacher or the value of expert knowledge. Constructivism modifies that role, so that teacher helps students to construct knowledge rather than to reproduce a series of facts. The constructivist teacher provides tools such as problem solving and inquiry based learning activities with which students formulate and test their ideas, draw conclusions and inferences and pool and convey their knowledge in a collaborative learning environment. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than just mechanically from the teacher or the textbook. Students become engaged by applying their existing knowledge and real world experience, learning to hypothesize, testing their theories and ultimately drawing conclusions.

So, the notion that people built their own knowledge and their own understanding by representation of knowledge from their own experiences and thought is called constructivism. The implementation of constructivism in teaching learning process is significant need of contemporary education. For the implementation of constructivism, science is wider and perfect field. Constructivist view of learning science suggests that learner can only make sense of new situations in terms of their existing understanding. Constructivist approaches in teaching and learning have had significant impact on recent in science education in UK and elsewhere. The implication of such a view is that teachers need to find out learners’ ideas in order to take this into account in their teaching. Teachers then need to provide the experiences which challenge the learner’s current understanding in order to help them reconstruct their ideas.

From last 20 years there were many research studies conducted by the educators of different universities of the world. The main theme and subject matters of their researches are briefly described below.

- The study under the title ‘Implementation of Constructivist approach among chemistry student teachers in teaching chemistry during their teaching practices’ by
Kiew Siaw Fui in 2010 at faculty of Education University Technology Malaysia indicated that microteaching class is the major factor influencing student teachers to implement constructivist approach in their teaching. However, the main obstacle in implementing constructivist approach is time insufficiency, and thus requires the concern of faculty.

- ‘The effects of a Constructivist-based Mathematics problem solving Instructional Program on the achievement of grade five students in Belize’ by Brown-Lopez, Priscilla, Alva, Marie in 2010 examined whether social constructivist activities can improve the mathematical competency of grade five students in Belize, Central America.

- Theera Haruthaithanasan in 2010 studied about the effects of experiences with constructivist instruction on attitudes toward democracy among THAI college students in Graduate school at the University of Missouri. The study draws on Dewey’s theory that constructivist instruction embraces the philosophy of democracy with regards to enhancing students’ individual and social constructivist learning.

- “The effects of constructivist learning activities on trainee teachers’ academic achievement and attitudes” by Aytunga Oguz in 2008. The aim of this study is to find out the effects of active learning methods based on constructivist approach on the prospective teachers’ achievements, attitudes towards the subject matter and perceptions about the learning process.

- Ken Rowe in 2006 investigated under the title “Effective reaching practices for students with and without learning difficulties” at Sydney. This study focused on teaching strategies that are demonstrably effective in maximizing the achievement progress of student during the early and middle years of schooling.

- Leach, Ametler, Hind, Lewis and scott conducted a study in 2005 to verify the feasibility of designing short teaching sequences, and which based on insights from research and scholarship on teaching and learning science, which were measurably better at promoting conceptual understanding amongst students than the teaching approaches usually used by their schools.

- The study developed constructivist approach experiments to determine its effectiveness in teaching physics concepts by Lorelei C. City. Tabago in 2005 revealed that the Constructivist Approach Experiments are effective in enhancing
students’ achievement and in developing a more positive attitude towards the subject than the traditional approach.

- The research study under the title “Building mathematical understanding in the classroom: a constructivist teaching approach” by Department of Education in Australia focused on effective constructivist teaching strategies designed to support students in improving their numeracy skills.

- Stinger and Garfingel in 2003 conducted a study lasting two months. A classroom of fifteen language minority first graders participated in an open ended constructivist project with the aim of fostering critical thinking skills, creating independent and motivated learners, and meeting the state of reflections, surveys, and formal assessment were used to report the project. At the end of the project, it was found that students were engaged in the constructivist approach to learning.

From above researches it was concluded that there were many researches done so far on constructivist teaching strategies for different perspectives and for different purposes. The constructivist approach triumphs in all purposes and educational conditions. From above researches it was seen that there wasn’t any research done to study the effect of constructivist teaching on phases of learning described by Benjamin Bloom. It was not studied so far whether constructivist approach is more effective than the traditional teaching approach in inculcating processing skills among the students and whether it is effective in developing meta-cognitive skills in students.

By considering all above questions, facts and statements in mind researcher wanted to study the effectiveness of constructivist teaching approach on students’ four phases of learning, on students’ processing skills and on meta-cognitive skills. So he has done his research under the title

“Effectiveness of Constructivist Approach in Teaching Science at Primary Level”

1.2 TITLE:
The title of the present study is:

“Effectiveness of Constructivist Approach in Teaching Science at Primary Level.”
1.3 STATEMENT OF THE PROBLEM:

In present research there was study about effectiveness of constructivist approach against the traditional approach in teaching science at primary level.

In present research there was study about effectiveness of constructivist teaching approach on four phases of learning. These four phases of learning were:
1. Information getting
2. Applying
3. Analyzing
4. Creating

In present research there was study about effectiveness of constructivist teaching approach on processing skills. These processing skills were:
1. Recalling
2. Comparing
3. Classifying
4. Imagining

In present research there was study about effectiveness of constructivist teaching approach on students’ meta-cognitive skills.

In present research (1) Constructivist teaching approach and (2) Traditional teaching approach were independent variables.

In present research (1) Four phases of learning, (2) Processing skills and (3) Meta-Cognitive skills were dependent variables.

In present research gender difference was controlled variable and school atmosphere, parental guidance, extra coaching were intervenes variables.

1.4 DEFINITION OF TERMS:

(1) CONSTRUCTIVISM:

Dictionary meaning: School of thoughts about construction of new ideas.

Theoretical meaning: Constructivism is basically a theory about observation and scientific study about how people learn. It says that people construct their own understanding and knowledge about the world through experiencing things and reflecting on those experiences.

(2) CONSTRUCTIVIST APPROACH:

Dictionary meaning: Ways to fit together, approach for management or composition.

Theoretical meaning: Constructivist approach of teaching is based on constructivist learning theory. This theoretical framework holds that learning always build upon knowledge that student already knows. This prior knowledge is call schema. Because all learning is filtered
through pre-existing schemata, constructivist suggests that learning is more effective when student actively engage in learning process rather than attempting to receive knowledge passively.

**Operational meaning:** In present research constructivist approach of teaching means to teach science to students of primary level by using different activities which fosters learning, processing skills and comprehension ability of students.

(3) SCIENCE:

**Dictionary meaning:** Science is a systematic knowledge based on observation and experiment.

**Theoretical meaning:** According to multicultural history of science page at Vanderbit University science involves more than gaining of knowledge. It is the systematic and organized inquiry into the natural world and its phenomena. Science is about gaining a deeper and often useful understanding of the world.

**Operational meaning:** In present research science means science subject taught at primary level in government schools of Gujarat state through the textbook ‘science and technology’ published by GCERT.

(4) SCIENCE TEACHING:

**Dictionary meaning:** Science teaching means to teach science subject at primary schools, high school and college level.

**Theoretical meaning:** According to the book, The Art of Teaching Science, 2nd Edition, the art of teaching science emphasized a humanistic, experiential and constructivist approach to teaching and learning and integrates a wide variety of pedagogical tools. Becoming a science teacher is a creative process and encourages students to construct idea about science teaching through their interaction with pears, mentors and instructors and through hands-on, minds-on activities designed to foster a collaborative, thoughtful learning environment.

**Operational meaning:** In present research constructivist approach in teaching science means students of primary level taught by using constructivist approach of teaching and traditional approach of teaching and studied about effectiveness of constructivist approach against traditional approach of teaching.

(5) TEACHING SCIENCE AT PRIMARY LEVEL:

In this research teaching science at primary level means to teach science subject to the students of higher primary level.
(6) FOUR PHASES OF LEARNING:

In present research four phases of learning according to Bloom’s Taxonomy were (1) Information getting, (2) Applying, (3) Analyzing and (4) Creating.

Achievement tests were constructed to study the effectiveness of constructivist approach of teaching on four phases of learning.

(7) PROCESSING SKILLS:

**Theoretical meaning:** Process skills are a means for learning and are essential to the conduct of science. Perhaps the best way to teach process skills is to let students carry out scientific investigations and then to point out the process skills they used in the course of the investigations.

**Operational meaning:** In present research the effectiveness of constructivist approach of teaching on science processing skills like (1) recalling, (2) comparing, (3) classifying and (4) imagining were measured by using science processing skills test constructed by the researcher.

(8) META-COGNITIVE SKILLS:

**Theoretical meaning:** Meta cognitive refers to a person’s ability to understand his or her internal thoughts and plans, as well as share those thoughts with others. Memory is very important in meta cognition. Meta cognitive skills make you aware of your own knowledge, the ability to understand, control and manipulate your own cognitive process. In short, you learn to learn. It is important to know the process of learning and understanding own approach to it.

**Operational meaning:** In present research to study the effectiveness of constructivist approach of teaching on student’s meta-cognitive skills a meta-cognitive skills awareness inventory prepared by P. B. Acharya was used.

1.5 OBJECTIVES OF THE STUDY:

In present research to study the effectiveness of constructivist teaching approach against traditional teaching approach following objectives were formed.

1. To study the effectiveness of constructivist approach on four phases of learning science at primary level.
To study the effectiveness of constructivist approach on “information getting” in learning science at primary level.

To study the effectiveness of constructivist approach on “applying” in learning science at primary level.

To study the effectiveness of constructivist approach on “analyzing” in learning science at primary level.

To study the effectiveness of constructivist approach on “creating” in learning science at primary level.

To study the effectiveness of constructivist approach on “recalling” in learning science at primary level.

To study the effectiveness of constructivist approach on “comparing” in learning science at primary level.

To study the effectiveness of constructivist approach on “classifying” in learning science at primary level.

To study the effectiveness of constructivist approach on “imagining” in learning science at primary level.

To study the effectiveness of constructivist approach on processing skills in learning science at primary level.

To study the effectiveness of constructivist approach on “metacognitive skills” in learning science at primary level.

1.6 HYPOTHESES OF THE STUDY:

To compare the effectiveness of constructivist teaching approach and traditional teaching approach in learning science and for the fulfillment of research objectives following null hypotheses were constructed and tasted.

Ho$_1$ There will be no significant difference between the mean scores of experimental group and control group on achievement test for information getting in science at primary level.

Ho$_2$ There will be no significant difference between the mean scores of experimental group and control group on achievement test for applying in science at primary level.
Ho3 There will be no significant difference between the mean scores of experimental group and control group on achievement test for analyzing in science at primary level.

Ho4 There will be no significant difference between the mean scores of experimental group and control group on achievement test for creating in science at primary level.

Ho5 There will be no significant difference between the mean scores of experimental group and control group on achievement test for total achievement in science at primary level.

Ho6 There will be no significant difference between the mean scores of experimental group and control group on recalling in science at primary level.

Ho7 There will be no significant difference between the mean scores of experimental group and control group on comparing in science at primary level.

Ho8 There will be no significant difference between the mean scores of experimental group and control group on classifying in science at primary level.

Ho9 There will be no significant difference between the mean scores of experimental group and control group on imagining in science at primary level.

Ho10 There will be no significant difference between the mean scores of experimental group and control group on total processing skills in science at primary level.

Ho11 There will be no significant difference between the mean scores of experimental group and control group on meta cognitive skills awareness inventory in learning science at primary level.

1.7 VARIABLES OF THE STUDY:

In present research following variables were studied to fulfill the research objectives and for testing the null hypotheses.
In present study teaching methods i.e. constructivist teaching approach and traditional teaching approach were independent variables where as four phases of learning, processing skills and meta-cognitive skills were dependent variables. The variables of the present research are described in table as:

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent variables</td>
<td>Teaching methods</td>
<td>1. Constructivist approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Traditional approach</td>
</tr>
<tr>
<td>Dependent variables</td>
<td>Four phases of learning</td>
<td>1. Information getting</td>
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<td></td>
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<td>2. Applying</td>
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<td>3. Analyzing</td>
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<td>4. Creating</td>
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<td>5. Total Achievement</td>
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<tr>
<td></td>
<td>Processing skills</td>
<td>1. Recalling</td>
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<td></td>
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<td>2. Comparing</td>
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<td>3. Classifying</td>
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<td>4. Imagining</td>
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<td>5. Total processing skills</td>
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<td></td>
<td>Meta-cognitive skills</td>
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</tr>
</tbody>
</table>

1.8 AREA OF THE STUDY:

In present study the comparison was made between two teaching approaches on discussed variables. So the area of the present study was teaching learning in science education.

1.9 DELIMITATION OF THE STUDY:

The present study was limited to the Gujarati medium primary schools governed by the municipal corporation of Anand, Anand District, Gujarat. The present research was limited to the students studied in standard 7 of primary schools in the academic year 2013-2014. To study the effectiveness of constructivist teaching approach and traditional teaching
approach, the researcher selected three chapters/units for his teaching program from the textbook of science and technology of standard 7 prepared by GCERT. These units were: 1. Characteristics of Magnet, 2. Fertility of soil and 3. Motion, Force and Speed.

1.10 IMPORTANCE OF THE STUDY:

Anybody who wants to further study about constructivist teaching will get following information from this research.

(1) From the present research one should compare the effectiveness of constructivist teaching approach and traditional teaching approach in teaching science.

(2) One should get information about effectiveness of constructivist teaching on four phases of learning against traditional teaching.

(3) One should get information about effectiveness of constructivist teaching on science processing skills of learners.

(4) One should get information about effectiveness of constructivist teaching on meta-cognitive skills of learners.

(5) One should get information about preparation of constructivist instruction materials and activities.

(6) One should get information about preparation of achievement tests and science processing skills test.

1.11 GUIDELINES ABOUT THE SCHEME OF CHAPERIZATION:

The present research is described in five chapters. The information about next chapters is given below.

(1) Chapter no.2 contains the information about review of related literatures. In this chapter the researcher give information about his detailed study related to his research. Moreover he give information about review of his study related researches and discussion about their results.

(2) Chapter no.3 is about methodology of the research. This chapter contains information about population and sample of the present research. This chapter gives information about
research design, preparation of constructivist teaching program, research tools, data collection and the techniques of data analysis.

(3) Chapter no.4 is about data analysis. This chapter gives information about how data were collected and analyzed by using proper technique and interpretations and conclusions made from the results of t-Test.

(4) Chapter no.5 contains summary, findings and conclusions from the study. This chapter gives information about results, recommendations and guidelines about further research.

(5) The last section is about bibliography and appendix.