

# The Study of the effectiveness of the inquiry- based learning method in chemistry teaching learning process

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**Abstract:** This research is a quantitative study in which traditional method is used in a limited way as compare to modern teaching method like inquiry based learning. The aim of this study was to find out effectiveness of inquiry-based learning method on student's achievement in chemistry lessons. A total of 80 students are selected in which 40 are rural and the other 40 are urban in jhunjhunu district. They were selected through purposive sampling methods, the group which was assigned as an experimental group was instructed through inquiry-based learning methods and another group was traditionally instructed. This research is an experimental study with non-proportional groups. In which the pre and post-test will be done with the control group and the classes will be in the form of control and experimental groups. These outcomes can be helpful for teachers considering the acceptance of an updated chemistry curriculum in their school district.

**Key Words:** inquiry based learning, chemistry, traditional method, purposive sampling method.

## 1. INTRODUCTION:

The development of models of teaching is ongoing innovation in teaching. A significant purpose behind talking about models of teaching is to help the teacher to have a wide scope of approaches for making a proper interactive environment for learning. The intelligent use of these methodologies empowers the teacher to adopt him to the learning needs of the students. Various educationists and psychologists have proposed a model way to deal with teaching. Flender (1970) put his interaction investigations as a model of teaching and for these methodologies, he arranged the statements of the students and teachers into ten categories. In India, the first National project on models of teaching was arranged, organized and executed during 1985-86. In many parts of our country, traditional teaching methods are used in educational organizations. In the traditional method, educators illustrated the idea to the students with the help of chalks and blackboard. Each significant thing with respect to the point is composed on the blackboard and students make important notes from the blackboard. After the lecture is over students revise their notes and attempt to remember the notes. The main target of traditional teaching is to pass the exams. For many students, the traditions classes are bored specially in the age of technology .As a result it affects this study badly and due to absence of effective learning methodology their interest getting lost.

Therefore, a new type of learning movement develops during the 1960s; in contrast of traditional method .This new learning method called inquiry based learning method. The philosophy of inquiry based learning related to constructivist learning theories ,such as the work of Pigate ,Dewet, Vygotsky and Freire among others[5][6][7], and can be considered a constructivist philosophy . Dewey's experimental learning pedagogy comprises the learner actively participating in authentic experiences to make some meaning from it [9][10] .Vygotsky approached constructivism as learning from on experience that is influenced by society. Inquiry based learning can be applied on all disciplines. Questioning and finding answer is an external important factor of inquiry based learning. It is basically teaching the student in a different way that they have greater understand of the discipline at which they work, communicate, learn and live in.

### 1.1. Literature review:

Edelson et al. (1999) presented a design history covering four peers of software and curriculum to display how these challenges ascend in classrooms and how the design strategies reply to them. They had been reconnoitering these challenges through a program of exploration on the consumption of scientific visualization technologies to upkeep inquiry-based learning in the geosciences. In this paper, they described five momentous challenges to employing inquiry-based learning and presented the strategies for lecturing them through the design of technology and curriculum [32]. Garcia et al. (2003) shown that an inquiry based, pro-active method was the superlative way to demonstrate science in an ecosphere where facts modification repeatedly and the difficulty of the issues confronted would only growth with time. In reaction to this need, numerous higher school districts in the U.S. had implemented innovative science series in which the emphasis was on inquiry type instruction. Yet still, science literacy had been relaxed to illustration improvement in undeveloped children. This research was showed to see how considerable of a role teacher's attitudes

towards science itself, and science instruction in specific, played in determining to practice an inquiry approach to teaching science. Surveys concerning science upbringing, science training and instruction, and teacher attitude towards science were directed to teachers presently in elementary classrooms teaching science. Replies were gathered and investigated, and the results were really amazing. Read on to discover how teachers actually felt roughly teaching science in today's Schoolrooms [28]. Balaban et al. (2007) discussed the sanction on the consequence of inquiry learning in the sciences. She serrated out that although people might expected different things/practices when they referred to inquiry-based learning, there were decisive characteristics that required being nearby, including an integrated prospectus across regulation, a problem based teaching room, and deliberation to skills enlargement [18]. Tsai et al. (2007) investigated the consequence of inquiry-based teaching on 8th graders' impulses in learning physical science. Total 295 students were involved in this reading. The experimental group (EG) enclosed of 5 classes (n=155), the nested inquiry-based instruction model was conceded out in three units: "The basic structures of matter", "The structure of element" and "Temperature and Heat" over the phase of four months. The control group (TTM) contained 5 classes of students (n=140). Students' discernments on the fundamental inspiration were steadfast using the students' motivation towards science learning (SMTSL) questionnaire, composed from both groups before and after the tentative period [90]. Courtade et al. (2010) determined if teachers of students with judicious and undecorated intellectual incapacities could acquire to practice a task analysis for inquiry-based science instruction and if this training increased student responding. The conclusions of this study confirmed a practical association between the inquiry-based science teaching preparation and teacher's capability to teach students with reasonable and simple incapacities in science [50]. Alkahr et al. (2011) described the progression of three faculties employing inquiry based learning (IBL) in their surroundings. The focus of the article was on in what way the instructors made conclusions related to expending IBL in their classes. They provided a stimulating representation of their conclusions and their discernments of the usefulness of their decisions. Observations from the teachers provided a frame into how they were thoughtful about using the IBL attitude in their classrooms [10]. Pandey et al. (2011) investigated the efficiency of Inquiry Training Model over conservative teaching technique in teaching physical science at the secondary level of science students. A total of 100 students contributed in the study. The author designated the randomized groups, pre-test post-test enterprise in true untried design. Results exposed a statistically noteworthy consequence of Inquiry Training Model (ITM) over conservative teaching method on Academic accomplishment of students. Based upon the achievement test in physical science (ATPS), schooling of physical science through Inquiry Training Model was additional operational than the teaching through the Predictable Method at the subordinate level. The ITM model might be encouraged as a better tool than the conventional method for teaching Physical Science. However, the work carried out was having certain limitations such as the unit of lesson-plans based on Physical Science was specified only 4 sub-units [2]. Spencer et al. (2012) explored inquiry-based instructional approaches as a technique for producing student attention in science. Inquiry was a procedure that students used to decide indecision. Grounded in the work of John Dewey, inquiry was compulsory a person to practice philosophical and perilous thinking assistances. Inquiry-based teaching was student centered and the teacher was watched as the implementer of knowledge and learning. The paper engrossed on two inquiry-based instructional approaches: The 5E model and Concept accomplishment. The 5E model used five stages: engage, explore, explain, elaborate, and evaluate. The concept accomplishment model was suitable for teaching ideas that had a vibrant set of characteristics. This approach used a procedure that agreed students to generate their own descriptions and considerate [89]. Abdi et al. (2014) investigated the belongings of inquiry-based learning method on students' academic accomplishment in sciences class. A total of 40 fifth grade students from two different classes were convoluted in the study. They were selected through purposive sampling technique. The group which was allocated as tentative group was 47 initiated through inquiry-based learning technique whereas the supplementary group was conventionally educated. This experimental study persisted eight weeks. To determine the efficiency of inquiry-based learning method over outdated teaching, an achievement test about sciences which entailed of 30 items was directed as pre-test and post-test to students both in the investigational and control groups. For the numerical analysis, Analysis of Covariance (ANCOVA) was used. The results exhibited that students who were instructed through inquiry-based learning were accomplished greater score than the ones which were inculcated through the outmoded method [60].

**1.2. Questions to select the problem:** The following questions are for selection of problem -

- Whether the students are interested in chemistry and subject matter or not.
- Whether or not the use of new and innovative learning methods in place of conventional methods of teaching would
- differ?
- Whether the effectiveness of training should be enhanced for students to study chemistry and subject matter.
- Choose different approaches in teaching methods are what chemistry makes effective science teaching.
- Using inquiry - based learning methods, students of chemistry may be interested in learning about the subject.

### 1.3. Statements of the problem:

The statement of problem for this research is- “The Study of the effectiveness of the inquiry- based learning method in chemistry teaching learning process.”

**1.4. Hypothesis:** James E. Gerton - The hypothesis is a solution to the supposed problem which can be interpreted on the basis of inspection by that circumstance. Null hypotheses are formulated for the proposed study.

**1.4.1. Conceptual Hypothesis:** There is no significance difference between the academic achievements of 11th class students in chemistry taught by Inquiry-based teaching method and traditional teaching method.

### 1.4.2. Operational Hypotheses:-

- There is no significance difference between the academic achievements of 11<sup>th</sup> class urban students & rural students in chemistry taught by Inquiry-based teaching method.
- There is no significance difference between the academic achievements of 11th class urban student & rural students in chemistry taught by traditional teaching method.
- There is no significance difference between the academic achievements of 11th class urban boys and urban girl students studying the chemistry taught by Inquiry-based teaching method.
- There is no significance difference between the academic achievements of 11<sup>th</sup> class urban boys and urban girl students studying the chemistry taught by traditional teaching method.
- There is no significance difference between the academic achievements of 11<sup>th</sup> class rural boys and rural girl students in chemistry taught by Inquiry-based teaching method.
- There is no significance difference between the academic achievements of 11<sup>th</sup> class rural boys and rural girl students in chemistry taught by traditional method.

## 2. METHODOLOGY:

**2.1. Design of the study:** This examination was a quasi-experimental investigation with non-proportionate groups, which includes pre and post-test plans with the control group. Since the classes started toward the start of the new semester by school organization, it was impractical to assign out students randomly to both experimental and control groups. In any case, the classes were randomly assigned out as control and experimental group. The experiment design pattern, O1 is experiment group while O2 is control group. “X” represents treatment i.e. Inquiry-Based teaching approach (learning cycle model). The table represents experimental design pattern clearly-

Group	Pre-test	Experiment test	Post-test
Experimental group	O1	X	O1
Control group	O2	-	O2

**2.2. Sampling:** A sample is a proportion of the population selected for study. The essential requirement for any sample is that it should be as comprehensive as possible of the population or the universe from which it has been drawn. In this sample of 80 students of jhunjhunu district of 11<sup>th</sup> class will be selected.

**2.3. Population:** Population refers to the inspections of entire units. Students of class 11<sup>th</sup> of higher secondary schools of jhunjhunu district of Rajasthan will be taken for study.

**2.4. Analysis of data:** In this study the researcher used many statistical techniques like mean, standard derivation and t-test.

**2.5. Research procedure:** Two methods have been used for study in this research.

- ✓ Inquiry-based learning method
- ✓ Traditional teaching method
- The study will be conducted pre and post test and class will be done as experimental or control group.
- The experimental group will be used to teach the 5E learning cycle, while the control group will be taught with traditional methods.

**2.5. Tool with dimension:** For this researcher will make a self-made lesson plan. Will use the lesson plan for inquiry based learning method and traditional teaching method in the chosen teaching method.

**2.6. Population and sample:** Population refers to the inspections of entire units. Students of class 11<sup>th</sup> of higher secondary schools of jhunjhunu district of Rajasthan will be taken for study.

**2.8. Research method:** Two methods have been used for study in this research.

- ✓ Inquiry-based learning method
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**2.9. Objective of the study:** The main objective of the study is as follows:-

- Comparative study of academic achievement of chemistry students by traditional teaching system and inquiry-based teaching method.
- To study the academic achievement of chemistry students of urban and rural areas.
- To make students interest towards chemistry.

**2.10. Educational implications:** The existing education system is limited. Book academic and students study facts and principles only. Current education learning strategies are far from social and actual contexts.

- In this study, the study method is helpful in skill development through an inquiry-based education system.
- This study will awaken interest in chemistry subjects in the students.
- In education through the use of inquiry-based education system in this study. Teachers of chemistry use new education system than traditional education system.

### 3. CONCLUSION:

Based on some findings of the study it can be said that students who taught by the inquiry-based learning method supported the 5E learning method represents more progress as compared to those students who taught by the traditional method. This study also summarizes that students taught by inquiry-based learning covered more information and they have a broad sense of thinking. The performance of these students is active in the classroom.

### REFERENCES:

1. Ali Iran ( 2014) - Inquiry Based Learning Mode Achievement in the study of science text.
2. Anandan , a region , N.( 2008) - creative Jisitii Journal education Expansion of off - shore and research .
3. Alam , MS ( 1997) The Effectiveness of Motivational Thinking and Testing Tutorials The students of secondary schools are trained in biology science.
4. Anderson, R. (1997). The research on teaching as inquiry. Paper presented for the Center for Science, Mathematics and Engineering Education. National Research Council, Washington D.C.[3].
5. Anderson, R. (2002). Reforming Science Teaching: What research says about inquiry. Journal of Science Teacher Education, 13, 1-2.
6. Balaban, Marie T.(2007) "Implementing Inquiry- or Problem-Based Learning the Undergraduate Science Curriculum: Ideals, Examples, and Concerns. Developing & Sustaining a Research-Supportive Curriculum: A Compendium of Successful Practices", eds. Kerry K. Karukstis and Timothy E. Elgren. Washington, DC: Council on Undergraduate Research.
7. Bybee, R. W. (2000) Teaching Science as Inquiry. In J. minstrell & E. H. van Zee (Eds.), *Inquiry into inquiry learning and teaching in science* (pp. 20–46). Washington, DC: American Association for the Advancement of Science .
8. Carroll, J (1963). "A model of school learning", Teachers College Record, Volume 64.
9. D.C. Edelson, D.N. Gordin, and R.D.Pea, "Addressing the Challenges of Inquiry-Based Learning Through Technology and Curriculum Design," Journal of the Learning Sciences, Volume 8 [33].
10. Genie Black (2002), "A Comparison of Traditional, Online and Hybrid Methods of Course Delivery", Journal of Business Administration online, Vol. 1 No. 1.
11. Hsiao-Lin Tuan, Chi-Chin Chin(2005), Investigating The Effectiveness Of Inquiry Instruction On The Motivation Of Different Learning Styles Students, International Journal Of Science And Mathematics Education , Vol. 3.
12. M. Herron (1971), "The nature of scientific enquiry". School Review, Vol. 79 Issue 2.
13. Pandey. A, Nanda. G. K. and Ranjan. V (2011) "Effectiveness of Inquiry Training Model over Conventional Teaching Method on Academic Achievement of Science Students in India," Journal of Innovative Research in Education, vol.1(1), pp. 7-20.
14. Peggy Brickman(2006), "Effects of Inquiry-based Learning on Students' Science Literacy Skills and Confidence", International Journal for the Scholarship of Teaching and Learning, Vol. 3, No. 2, pp. 1-26.
15. Secker.v.c(2002) Effects of Inquiry-Based Teacher Practices on Science Excellence and Equity .The Journal of Educational Research [Vol. 95(No. 3)]
16. TSAI, Chih-Chung TUAN, Hsiao-Lin(2006), "Investigating the inquiry-based instruction effects the 8th graders' perceptions about learning environments in the physical science" in proceeding of APERA Conference.