

The Study of the Effectiveness of the Inquiry- Based Learning Method in Chemistry Teaching Learning Process

Paper Submission: 12/03/2020, Date of Acceptance: 28/03/2020, Date of Publication:30/3/2020



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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.

Keywords: Inquiry Based Learning, Chemistry, Traditional Method, Purposive Sampling Method.

Introduction

The term inquiry, in general, refers to an act of asking for information or investigates something. During the 1960s, the discovery learning movement was developed in response to traditional forms of instruction where people were required to memorize information from instructional materials. Hence inquiry-based learning is a form of active learning that starts by asking questions, scenarios, and problems. This learning method contrasts with the traditional method, which generally relies on the fact that teacher presented before them and there was no further any questions from both student and teachers but inquiry-based learning is often assisted by a facilitator rather than a lecturer. Inquirers such as students will identify and research issues and questions to develop knowledge or solutions. They might research to find answers, engage in activities that will help them to pursue answers and find a new way to detect answers regardless the same way to search out it. By engaging in such type of learning method, students come to understand that they can take responsibility for their learning.

Inquiry-based learning strategies include the principles of creative learning such as Pieget, Dewey, the work of Wagowski and Freier. Marshall Heron in 1971 formally formulated in which a special laboratory developed the scale to evaluate the amount of questioning in practice. Heather bani and Randy Bell graphically outlines four levels of scrutiny of the headline of many levels of investigation.

Scientific information in the current information and technological era increases day- today. Technologies became more and more advance and play a major role in development for the future of society. The main goal of science education is to develop scientific literacy among students. In the inquiry-based learning of science process students are engaged in many activities. Use scientific processes to create new knowledge. Encourage the science faculty to change traditional academics- centered practices such as lecturers, textbooks and scientific facts.

There is an oriented approach to investigating-

1. Science involves the students' interest.
2. Provide opportunities for students to use fairly collect evidence.
3. Encourage students to further study to develop a more detailed explanation.

4. Emphasizing the importance of writing the scientific interpretation.
5. Students will act as scientists in inquiry-based activities. Experience the process of knowing and also experience the rationality of knowledge.

Review literature

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 ecosystem 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].

Alkaheer 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].

Treagust et al. (2014) discussed the nature of inquiry learning and how this related to inquiry teaching and the kinds of evidence needed to ascertain that this mode of learning and teaching was operational. First, he measured what was meant by inquiry learning and teaching, and then examined particular curriculum backgrounds based on inquiry learning, such as Primary Influences, Model-based Education, and Process-Oriented Guided Inquiry Learning [35].

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.

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.

Operational Hypotheses

- (1) a) There is no significance difference between the academic achievements of 11th class urban students & rural students in chemistry taught by Inquiry-based teaching method.
(b) There is no significance difference between the academic achievements of 11th class urban student & rural students in chemistry taught by traditional teaching method.
- (2) a) 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.
(b) There is no significance difference between the academic achievements of 11th class urban boys and urban girl students studying the chemistry taught by traditional teaching method.
- (3) a) There is no significance difference between the academic achievements of 11th class rural boys and rural girl students in chemistry taught by Inquiry-based teaching method.
(b) There is no significance difference between the academic achievements of 11th class rural boys and rural girl students in chemistry taught by traditional method.

Research Design

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

Research Process

Study outline - This research is experimental study with non-equivalent 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. There will be O1 experiment group O2 control group. 5E learning process is used for finding the result of this study.

In this research, mean standard deviation and t-test in statistics will be used to perform data analysis.

Objective of the study

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

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.

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

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.

Note

the research is in progress. The research discussions, findings and suggestions will be analyze after the competition of research work and will present in later research paper

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