

A Study on the effectiveness of the Inquiry- based learning

Method in chemistry teaching learning process

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Abstract: The aim of this study is to find out effectiveness of inquiry based learning on students achievement in chemistry. The inquiry method encourages students interest, deeper understanding and inspires creativity. A total of 120 students are selected in which they are divided in two equal groups of 60 students from rural and urban areas of jhunjhunu district. Two groups are form, in which one group is taught by traditional method (control group) and another group is taught by inquiry based learning method (experimental group). The results shows that students taught by inquiry based learning method signifies more effective results as compare to students taught by traditional method.

Keywords: inquiry based learning, chemistry, traditional method, achievement.

Introduction:

The development of models of teaching is ongoing innovation in teaching. During the 1960s, the discovery learning movement was developed in response to traditional forms of teaching where people were required to memorize data or information from lectures. 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. Hence inquiry-based learning is a form of modern learning methods and has an active learning process that starts by asking questions, scenarios, and problems.

The philosophy of inquiry based learning related to constructivist learning theories ,such as the work of Pigate ,Dewet, Vygotsky and Freire among others 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.Vygotasky approached constructivism as learning from on experience that is influenced by society.

Inquiry based learning can be applied in all fields. Questioning and finding answer is an 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 communicate, work and learn.

Literature review:

Ali Iran (2014) - In order to know the achievement in the study of science text, students learn from the study of their studies through an orientation-based learning method. In this 40 Students were taken from different classes. In this, he studied comparative study on traditional research and inquiry-based method groups. Statistics Analysis, A.C.O.V.A. Used. It concluded that Inquiries based on learning method was influential compared to conventional method.

Paturkar, (1987). Considered the effectiveness of lesson plans dependent on ITM to comprehend the ideas of science for the students of standard VII. Aims of the investigation were:

- 1) To examine the advancement of logical thinking among the students while learning inquiry strategies.
- 2) To watch the dynamic advancement of inquiry skills.
- 3) To study the (qualitative and quantitative) impacts of ITM for understanding ideas of science and problem solving capabilities.

The sample included two equivalent groups of 30 students (age group 11 to 12 years) each. Purposive sampling technique was used. All members were girls from standard VII. Pre-test, Post-test design was employed. One group was experimental while the other one was a control group. Five science lesson was dependent on ITM were led on experimental groups' test, and layout for classification of questions were utilized for making outcomes. Tools used were Science achievement test, Pre-test, and Post-test, Template for characterization of questions. The discoveries of the study showed that there was a significant - improvement of inquiry abilities over the five sessions. The inquiry was increasingly sorted out toward the end. There was a noteworthy rise in solving problems. The treatment (utilization of ITM) affected student's accomplishment and on understanding ideas of science.

Comfort korkor Sam et. al. (2018), aim to identify the effectiveness of 3e, 5e and the conventional approaches in high secondary school in biology lessons. For this study a mixed method approach is used. Sample was selected as three science classes in three senior secondary school.

For the qualitative study- 5e and 3e learning approach is used. For quantitative study- a pre-test-post-test non-equivalent quasi experimental design with two experimental groups was used. ANCOVA and independent t-test were used to interpret the data. The students exposed to the 3E and 5E approaches showed positive attitudes towards learning cycle when they were interviewed.

A S Adam (2019) This study to determine the effect of inquiry based laboratory on the students HOTS (high order thinking skills) in learning harmonic vibration and also used descriptive

quantitative true experiment. The sample was 69 students consisting of two experimental groups including 46 students and one control group including 23 students. The result of this research shows that the experimental groups have ability to analyze evaluation and create.

Stephen Twumasi Annam (2019) the purpose of this study to describe the difference between lectures teaching method and inquiry teaching method. The study held on the students of Mawuko girls' school in Ho municipality in biology subject. Inquiry method proved more effective than lecture methods in enhancing students in biology.

Jung A Moon (2018) This study investigated how a guidance method that's segments a complex task into simpler subtasks affects adults inquiry based learning in a science simulation environment. This study was designed for adults. This result indicates that the guided participants conducted more systematic and comprehensive investigations and reported a lower level of cognitive load compared with the unguided participants.

Karen Burke Da Silva (2015) the aim of this study is increasing the opportunity for students to be involved in inquiry based activities can improve engagement with contents and assist in the development of analysis and critical thinking skills. This study is for improving the learning outcomes of large first year biology cohort and 100 students are involves. This study results suggest impact of the redevelopment on student's satisfaction and learning outcomes and students were surveyed and multiple choice exam data was compared before and after the redevelopment.

Wayan Dasna (2019), this study aims to identify the effectiveness of inquiry based learning on the conceptual understanding of students with various learning styles in the multimedia learning environment. 157 primary school students were selected in Bali, Indonesia. Tools used are questionnaire and conceptual understanding test for measuring students understanding through multiple choice tests. This research shows a significant difference in this learning strategy and older one.

Objective of the study:

- (1) Comparative study of academic achievement of 11th class chemistry students is to be done by traditional teaching method and inquiry based teaching method.
- (2) Educational achievement of students towards the subject of chemistry of 11th class in senior secondary level schools in urban and rural areas.
- (3) To study the educational achievement of 11th class chemistry students from the traditional education system.
- (4) To study the educational achievement of 11th class chemistry students from the inquiry based method.

For the research purpose, three lessons have taken from 11th class chemistry book of RBSE board (hydrogen, s-block, oxidation-reduction reaction) are chosen. The lessons plans are based on 5 E learning method (engage, explore, explain, elaborate and evaluate).

Hypothesis of the study:

Conceptual hypothesis-

H00:- 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 hypothesis:-

H01(a): There is no significance difference between the academic achievements of 11th class urban students and rural students in chemistry taught by Inquiry-based teaching method.

H01(b) : There is no significance difference between the academic achievements of 11th class urban students and rural students in chemistry taught by traditional teaching method.

H02(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.

H02(b): There is no significance difference between the academic achievements of 11th class urban boys and urban girls student studying the chemistry taught by traditional teaching method.

H03(a): There is no significance difference between the academic achievements of 11th class rural boys and rural girls student in chemistry taught by inquiry based learning method.

H03(b): There is no significance difference between the academic achievements of 11th class rural boys and rural girl students in chemistry taught by traditional teaching method.

H04(a): There is no significance difference between the academic achievements of 11th class urban girl and rural girl students taught by inquiry based teaching method.

H04(b): There is no significance difference between the academic achievements of 11th class urban girl and rural girl students in chemistry taught by traditional teaching method.

H05: There is no significance difference between the academic achievements of 11th class urban boy students in chemistry taught by inquiry based learning method and traditional teaching method.

H06: There is no significance difference between the academic achievements of 11th class rural boy students in chemistry taught by inquiry based teaching method and traditional teaching method.

H07: There is no significance difference between the academic achievements of 11th class urban girl students in chemistry taught by inquiry based teaching method and traditional teaching method.

H08: There is no significance difference between the academic achievements of 11th class rural students in chemistry girl students in chemistry taught by inquiry based teaching method and traditional teaching method.

Methodology of study:-

This thesis is design to found effectiveness of inquiry based learning method in chemistry learning by 11th class students in compare to traditional learning method. This research was a quasi-experimental study with non-equivalent groups, which includes pre and post-test design with the control group. Quasi experimental is a design in which it needs an alternative measure for establish equivalence among experimental and control groups by which researcher is successful in doing so.

To determine the result by experimental study three lessons are chosen and design on the basis of 5 E learning method.

Lesson 1: oxidation and reduction reaction

Lesson 2: hydrogen

Lesson 3: s-block

Statistics:

In this study statistics were used are-

- Mean
- Standard deviation
- t-test

Education implications:-

1. Teacher must have to understand what is meant by inquiry based learning method and also knowing the advantages and disadvantages for inquiry.
2. In schools, there is need to provide material and research labs for students and teachers.

3. Providing a coordinate support system that maximizes the staff's opportunity to put more efforts in teaching through inquiry.
4. Teachers should think in new ways, which takes the form of new skills, instructional activities, behaviors, and so on.
5. Standards of both rural and urban area school need to be increase.
6. Government agencies provide financial and other help to institutions.
7. Need to make study student centered, so students take interest in it.
8. Need to design a curriculum for development of student's critical learning abilities, different skills.

Conclusion:

From the research 'The Study of the effectiveness of the inquiry- based learning method in chemistry teaching learning process' it may be gradually clarifies that inquiry based learning method is more effective than traditional teaching method of 11th class students. The findings of the study suggest to improve in academics inquiry based method must be implemented. It is accepted that inquiry method is beneficial for both urban and rural area schools.

References:

1. Bybee, R., Taylor J., Gardner A., Scotter, P., Powell, J., Westbrook, A., & Landes, N., (2006). The BSCS 5E Instructional Model: Origins, Effectives, and Applications. Executive Summary, BSCS, Colorado Springs, CO.
2. Abdi, A. (2014). The Effect of Inquiry-Based Learning Method on Students' Academic Achievement in Science Course. Universal journal of educational Research, 2(1), 37-41.
3. Spencer, T. L., & Tracy M. W. (2012). Creating a love for science for elementary students through inquiry-based learning. Journal of Virginia Science Education, 4(2), 18-25.
4. Kalia, A.K. (2005). "Effectiveness of Mastery learning strategy and Inquiry training model on pupils' achievement in Science". Indian Educational Review,41, pp.76-83.
5. Suchman, Richard,V. (1962). "The Elementary School Training Programmers in Scientific Inquiry, Report to the US office of Education". Project Title VII, Project 216, Urbana, Univ.of Illinois.
6. Jung A Moon &Debra Brockway (2019) Facilitating Learning in an Interactive Science Simulation: The Effects of Task Segmentation Guidance on Adults' Inquiry-Based Learning and Cognitive Load Pages 77-100 |<https://doi.org/10.1080/15391523.2019.1566038>
7. Comfort Korkor Sam1 , Kofi Acheaw Owusu2, , Christian Anthony-Krueger2(2018)- Effectiveness of 3E, 5E and Conventional Approaches of Teaching on Students' Achievement in High School Biology ,American Journal of Educational Research, 2018, Vol. 6, No. 1, 76-82

8. Seema, C. B. (2010). Effect of awareness of science structure and its method of inquiry upon school teachers teaching performance. *Research Bulletin Maharashtra State Council of Educational Research and Training*. 39 (1), 14-28.
9. Kaya, O., & Ebenezer, J. (2007). High school student's affective dispositions in science: Scientific inquiry with information technologies. Paper presented at the annual meeting of the American Educational Research Association, Chicago, USA.
10. Aditomo, A., Goodyear, P., Bliuc, A., & Ellis, R. A. "Inquiry-based learning in higher education: Principal forms, educational objectives, and disciplinary variations" *Studies in Higher Education*, pp. 1-20, 2011.
11. Pamela Adams, "The Role of Scholarship of Teaching in Faculty Development: Exploring an Inquiry-based Model", *International Journal for the Scholarship of Teaching and Learning*, Vol. 3, No. 1, pp. 1-22, January 2009.
12. Jinkins, D. (2002). Impact of the implementation of the teaching/learning cycle on teacher decision-making and emergent readers. *Reading Psychology*, 22(4), 267–288.
13. Secker.v.c(2002)Effects of Inquiry-Based Teacher Practices on Science Excellence and Equity .*The Journal of Educational Research* January February 2002 [Vol. 95(No. 3)]