Synthetical Review: Effectiveness of Inquiry Training Model for the Teaching of Mathematics

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Abstract:
The present study shows the importance of literature review to study the effectiveness of Inquiry Training Model (ITM) for the teaching of mathematics. In this study the concepts and elements of ITM are explained in detail. Importance of teaching mathematics is also explained. Finally the reasons to teach maths through ITM are also justified.

Introduction

"The leadership tomorrow depends on how we educate our students today, especially in those fields that hold the promise of producing future innovations and innovators and that's why education in math and science is so important."

- Obama

Maths is a subject of thinking and reasoning. It plays a vital role to develop thinking and reasoning ability of student. Maths teachers use different techniques to make subject topic more interesting as well as easy to understand. Different approaches are also applied by them. But most of the traditional approaches and techniques are failed to teach students to think and find the solution of a problem at their own. So, it is very necessary to teach maths through activities or by the methods in which students' active participation is must. Teacher is only a facilitator. Teaching through inquiry is one of the most favourable method to develop the thinking process in students' mind. Inquiry Training Model was specially designed by Richard suchmen to convert learners into thinkers which finally lead them to discover something new at their own.

Keywords: *Inquiry Training Model, Teaching, Mathematics*

1. Review of Related Literature

Literature review is very important step of research. It helps a researcher from writing hypothesis to applying statistics. It shows a direction to researcher. A researcher can find out research gaps from reviewing past researches and make research significant. Literature review can be done in two ways:

2. Theoretical Perspective

Theoretical review helps a researcher to understand key words and variables. With the conceptional clarity, a researcher can review past researches more fruitfully.

3. Inquiry Training Model

Inquiry Training Model (ITM) provides a chance to students to involve themselves in the process of finding out a solution. It develops an art of questioning in right direction.
Through ITM , students learn to gather information , to arrange the relevant information logically and sequentially. Finally they discover a new theory or solution of a sum at their own.
In short, Suchman 's theory is that:

1. Students ask questions naturally when they are puzzled.
2. They start thinking to analyze their strategies.
3. They learn through teamwork

4. Cooperative inquiry enriches thinking and help students to learn about the tentative solutions and alternative explanations.

4. Elements of inquiry training model

1.Syntax

Phase no.	Phase name	Information
1.	Introduction with the problem	Explain inquiry procedures, present discrepant event
2.	Data gathering-verification	Verify the nature of problem and and verify the occurrence of the problem situation.
3.	Data gathering-experimentation	Design connections between relevant variables. Hypothesize (and the test) casual relationships.
4.	Organizing, formulating an explanation	Formulate rule or explanations
5.	Analysis of the inquiry process	Analyze inquiry strategy and develop more effective ones

2.Social system

ITM is highly structured, with the teacher controlling interactions. Interaction among students should be encouraged.

3.Principles of reaction

5. Questions are phrased so they can be answered yes or no.
6. Ask the students to rephrase invalid questions.
7. Try to provide a free intellectual environment by not evaluating student theories.
8. Encourage the students to make clearer statements of theories and provide support for their generalization.

4. Support system

A teacher should use different resource material to introduce a problem to students. It is favourable to make presentation very clear. As a facilitator, a teacher can provide a guideline to use relevant material.

5. Reasons To Use Inquiry Training Model In Teaching Mathematics

Today, mathematics education is more than arithmetic and algorithms. The process of 'doing' mathematics is far more than just calculation or deduction It involves data, measurements, and recognition of patterns. It helps us to understand the world around us. Students who used hands-on experiments and team problem solving in mathematics classrooms have a better attitude about the subject than students who learned mathematics through lectures and assigned textbook reading. Through Inquiry students learn mathematical concepts and knowledge: by exploring, connecting, reasoning logically, and evaluating whether something makes sense or not.

6. Challenges of using Inquiry-Training Model In Maths Classroom

1. Teacher's expertise
2. Ability of teachers to use teaching aids
3. Power of communication
4. Age-level adaptation and learning environment adaptation

7. Teaching of Mathematics

Mathematics is the science of logical reasoning. It is exact, systematic, logical and clear so that once it is captured it can never be forgotten. It develops the ability of induction, deduction and generalization.

Teaching mathematics to young children is about developing strong number sense, generalizing their facts, using formulas and theories in relevant manner and lot more.

The main aims of teaching mathematics are:

1. To enable the child to solve mathematical problems in his daily life.
2. To develop the habit of concentration, self-confidence, self-reliance and discovery.
3. To develop the mental powers like thinking, reasoning etc. in the mind of the child.
4. To prepare the child for technical professions such as those of accounts, audits, bankers, surveyors, cashiers, scientists, architects and mathematics teachers.
5. To develop the skills to use the modern mathematical devices like calculators, computers etc.
6. To develop the abilities of analysis, synthesis, reasoning, computation etc.

8. Review of Past Researches

Rupsinh, S.V (2006), concluded that the Inquiry Training Model (ITM) improved the achievement of students more as compared to the students taught through the traditional method, The students of all levels in experimental group benefited by the ITM and the ITM developed Reasoning Ability in students better than that of Traditional Method. **Neeru, Neeru (2001),** concluded that students taught by Inquiry Training Model exhibited better mean gains as compared to the conventional method. Students taught through Inquiry Training Model and Mastery Learning Model retained more than those taught through conventional method. **Upadhyay Rohini (1999),** in the research ITM was found to be more effective than Traditional Method in terms of General creativity, Scientific creativity, Inductive reasoning, Theory building capacity, Achievement in science and Reaction towards ITM of class IX students. ITM was superior to Traditional method in bringing about significant favourable change in the class IX students' attitude towards science. The Traditional Method did not bring about significant favourable changes in the class IX students' attitude towards science. Majority of the class-IX students expressed favourable reaction towards ITM at the completion of the first three lessons and at the completion of the treatment. There was a significant favourable change in the class IX students' reaction towards ITM. **Priti Chaudhari (2015),** As per the analyzed data and the results obtained through opinionnaire, it can be concluded that implementation of Inquiry Training Model is effective in terms of arising curiosity in students, better retention of the concepts, generating interest in students and provoking them to ask questions and interact in class. **Siddiqui Mujibul Hasan (2013),** presented a research article on Inquiry Training Model. The whole theory given by Richard Suchmen was elaborated . Elements of ITM and its way of application is emphasized. **Pandey A., Nanda G.K.and Ranjan V. (2011),** It was concluded that The ITM model is a better tool than the conventional method for teaching Physical Science. However, the work carried out is having certain limitations such as the unit of lesson-plans based on Physical Science was specified only 4 sub-units. **Adem Duru (2010),** According to the research results, it was found that experimental teaching method was more effective than teacher-centered traditional teaching method in the knowledge and comprehension level.

8. Research Gaps

It is clear from the above reviews that ITM was applied in different subjects. The sample of the study was also from primary to higher secondary students. in India, very few researches were done using ITM. Among all past researches, only one researcher used ITM for teaching Mathematics. Variables used by the past researchers were also gender, area and some other psychological variable. Most of the researcher used standardized tools or self made test. Not a single researcher conducted a research on use of ITM in relation to mathematical attitude and mathematical aptitude.

The researcher, intends to fill the above mentioned gaps as follows:

1. The sample was restricted to students of standard IX only. So, the effect of ITM was checked more specifically and precisely.
2. Mathematical attitude and mathematical aptitude were taken as dependent variable .
3. Researcher standardized both the tools: mathematical attitude scale and mathematical aptitude test.

4. An attempt has ben made to measure the scores of mathematical attitude scale and mathematical aptitude test before and after the treatment.

9. Conclusion

Review of past researches, helped a researcher to decide variables. Researcher constructed hypothesis very easily due to reviewing past papers. The concepts and theories were cleared. Size of sample, sampling techniques and statistics were also decided on the basis of this review. In short, review of related literature , helped a researcher to design the framework of study. Researcher proceeded further to fill the research gaps.

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