

## DEVELOPMENT OF INQUIRY PROCESS FOR TEACHING OF SCIENCE USING INQUIRY TRAINING MODEL

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### Abstract

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*Present paper focuses on the scientific inquiry of discrepant problem from science. Researcher has tried to develop the inquiry process to solve the ill structured problem using the phases of inquiry training model. Researcher has selected the problem from science because science demand why.*

**Keywords** – *discrepant problem, verification, experimentation, theorising*



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### Introduction:

Teaching is an art and science. The art can be clearly seen as teachers find their own teaching style that calls for creativity, improvisation and expressiveness. Although teaching requires artistry it can be subjected to scientific scrutiny (Gage 1994). Teaching also requires scientific thoughts and ways through which content can be taught for more scientific and effective learning. There are many scientific ways to teach the content like methods, models strategies etc. Out of these, model is the more scientific way to present content before students and to create conducive atmosphere for learning.

**Eagan et.al. (1978)** given the definition of Models of teaching – Models of teaching are prescriptive strategies designed to achieve specific instructional goals. They are prescriptive the sense that the teacher's responsibilities and role during planning, implementing and evaluation stages are clearly defined.

**Bruce Joyce & Marsha Weil (1972)** have defined a model, as “ plan or pattern which can be used to shape a curriculum or course, to select instructional materials and to guide teacher's actions.

**Jangira & Singh (1978)** defined a model of teaching “as a set of interrelated components arranged in a sequence which provides guidelines to realize specific goals “

Models of teaching are not substitute for teaching skills, it cannot replace the abilities and qualities of teachers but in fact using the qualities, abilities and skills of teachers it makes the teaching more systematic and efficient. Models of teaching provide the guidelines for teaching not only for content but the process of learning.

**Bruce Joyce and Marsha Well have classified twenty-two models developed by them into following four families –**

1. Information processing models
2. Personal models
3. Behaviour modification models
4. Social interaction models

Out of these families, Inquiry training model comes under Information family. It is human nature that, if anything or unusual occurs in their surroundings, people are motivated to inquire about it. **Richard Suchman** carefully examined this phenomenon and developed an instructional model ‘Inquiry training Model’ to teach the students a process of scientific investigation based on a notion scientific method which attempts to teach students the skills and scientific inquiry.

**Elements of Inquiry in Inquiry training model –**

**A) Data gathering:** For **a.** verification **b.** Experimentation regarding  
1. Objects 2. Events 3. Properties 4. Conditions

**B) Theorising:** Explanation and formulation of laws principles and rules.

**Data gathering and theorising are two important intellectual operations involved in Inquiry training model.**

**Inquiry process for the topic (transpiration) from science including teacher’s instructions-**

**1. Explaining procedure by teacher:**

**Teacher** -Today we are going to solve the problem from biology through inquiry strategy. I will present the problem before you, you will have to ask me a series of questions whose answers will be Yes or NO to get information in order to verify what happened. You isolate the relevant variable and formulate your hypothesis and formulate the explanation about problem. Teacher should tell them the meaning **new terminology** like variable, hypothesis.

**2. Statement of problem (ill structured, inquiry-based problem) by teacher:**

**Teacher – Teacher states the problem and asks question** - The problem is – Take four fresh, healthy and green leaves labelled them A B C D. Tie them with thread near the petiole. Tie free

ends of threads to two poles. Apply a substance on all four leaves. After few hours it is seen that leaf A is fresh, leaf B is less fresh than A, leaf C start drying and leaf D is completely dry. Why this difference amongst the leaves? Is the problem clear to all?

**Students – Ask questions** – Is the substance applied to lower side of the leaf? Is the substance applied to upper side of the leaf? Is the substance applied to both sides of leaf?

**Teacher** – answers Yes/No.

### **3. Data gathering for Verification:**

**Teacher** – Students now collect the regarding nature of the objects their properties and conditions of occurrence of event.

**Students – Questions on verification of nature of objects** -Are the four leaves from same plant? Is the substance applied to four leaves same? Is the substance greasy? Should leaves be fresh? Should the leave be tied at the petiole only? Is sunlight necessary? Any light similar to sunlight would do?

**Teacher** – Teacher answers Yes/No

**Students – Questions on verification of nature of event** – Will the phenomenon occur in dark? Is the substance applied on both the sides of leaf A? Is the substance applied on both the sides of leaf B? Is it applied on one side only?

**Teacher** – Answers Yes/No

**Students – Questions on verification of property** – Is the substance applied on lower side of leaf C? Is it applied on upper side of leaf C? Is No substance applied on leaf D?

**Teacher - Takes the summery of data collected from students.**

**Students** – Four fresh green leaves A, B, C, D, are kept in the sunlight hanging freely from the petioles. Leaf A is applied with a greasy substance on both the sides. Leaf B is applied with same substance on lower side only. Leaf C is applied with the substance on the upper side and no substance is applied on leaf D.

**Teacher - Asks question to specify the problem** – What is the problem you have to solve?

**Students** – Why leaf A is fresh, leaf B is less fresh than A, leaf is starting to dry and leaf D is completely dry?

### **4. Data gathering for Experimentation – Formation of hypothesis**

**Students** – Is it due to application of substance? (**Hypothesis one**) Is it the process of transpiration? (**Hypothesis two**) Does it occur because of number of stomata on the leaf surface?

**Teacher** - Asks questions to test the hypotheses one- two- three. What happens to the leaf surface when the substance is applied? How does transpiration take place in leaves? Why the difference in the leaves?

#### **5. Theorising of data -**

**Students** - Students answer these questions with explanation and tested the hypotheses.

**Answer from students** – Because of greasy substance is applied on both sides of leaf, the stomata on both sides get clogged and no transpiration takes place therefore leaf A remains fresh. To leaf B the greasy substance is applied on lower side of the leaf, clogging most of the stomata. No transpiration takes place from lower side. Rate of transpiration from upper side is less than the lower side therefore this leaf is less fresh than leaf A but fresher than leaf C. Leaf is applied with the greasy substance on the upper side only, clogging the stomata on the upper side only which are few. Transpiration from the lower side takes place. Since the rate of transpiration from the lower side is more than the upper side the leaf begins to dry. Since no substance is applied to both sides of leaf D, transpiration from both sides takes place and the leaf dries up.

#### **Conclusion:**

There is wonderful Why that all students use. When they stop using it, the reason is that no one bothered to answer them. No one fostered and cultivated the student's inner sense of inquiry. All students are natural inquirers. All that is needed is some kind of stimulating problems and conducive environment for inquiry. Discrepancy in the problems motivates students to take up the problem immediately for scientific inquiry.

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