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# Challenging Methods of Teaching: The Predictive Inquiry Model

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## Introduction

Not surprisingly, challenging methods of teaching have been identified by a number of researchers (Rutter 1979, Edmonds 1982, Mortirnore 1988) as important in promoting efficient learning at both primary and secondary levels of schooling. Research findings indicate that high rates of student engagement in interesting and challenging learning experiences are related to superior levels of achievement (Schrenker 1976, Brophy and Good 1986). Challenging students through inquiry models of teaching, in particular, has resulted in increased understanding of subject material, productivity in creative thinking and development of skills for obtaining and analyzing information (Schrenker 1976, Voss 1982). The focus of this article is on the preparation and implementation of a Predictive Inquiry lesson in primary school science.

## The Predictlive Inquiry Model

A. Goals and Purposes

The Predictive Inquiry Model is designed to teach pupils a process for investigating and explaining unusual phenomena. Advocates of this teaching strategy believe that natural or social phenomena are understood best when the theory which explains their occurrence is supported by publicly observable evidence (Suchman 1962, Elefant 1980). The Predictive Inquiry Model encourages pupils to form and test hypotheses with evidence in order to arrive at warranted conclusions.

## B. Steps in the Predictive Inquiry Model

In the performance of inquiry lessons, teachers must withhold lecturing and the giving of information in favour of directing questions designed to encourage pupils to generate hypotheses, draw implications for theory, observe and weigh evidence, draw conclusions and design further tests of the knowledge they discover. The steps in the Predictive Inquiry Model are outlined below.

1. Introduction:
   Show or describe a situation for which the outcome is unknown to students.

2. Predictive Question:
   Pose the question "What will happen if.....? (the situation proceeds to its outcome).

3. Hypothesizing:
   Record pupils' hypotheses on the blackboard. Ask pupils to draw inferences from each hypothesis about the theory it implies.

4. Demonstration:
   Proceed with the demonstration or pupil experiment so that pupils can observe what happens.

5. Evaluation of Hypotheses:
   Have pupils evaluate the various hypotheses in light of the observed outcome.

6. Drawing Conclusions:
   Have pupils draw conclusions based on the most supported hypothesis and draw inferences for building theory.

7. Application:
   Have pupils suggest alternative procedures or additional evidence from every-day experience that could be used to further test the conclusion.

In the example lesson which follows, the steps of the predictive model of inquiry are illustrated. The topic of the lesson is simple so that the steps of the model are easy to follow.

**EXAMPLE LESSON PLAN**

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| CURRICULUM AREA | : | Science |
| LESSON TOPIC | : | Properties of air |
| GRADE LEVEL | : | Pr 5 |
| TIME | : | 40 minutes |

INSTRUCTIONAL OBJECTIVES

As a result of the lesson, pupils will be able to:

a) state one of the properties of air;

b) offer proof that air exerts pressure.

MATERIALS AND PREPARATION

1. Beakers, water, square of paper for each pupil, science notebook.
2. Lesson to be conducted outdoors.

INSTRUCTIONAL PROCEDURES

*Introduction*

1. Announce to the class that the purpose of the lesson is to inquire into the properties of air and to discover that air exerts pressure.
2. Issue beaker of water and square of paper to each pupil.

*Proceed through the steps of the model*

1. Describe the situation to the class: "We are going to fill our beakers with water and turn them upside down."

Predictive question: "What will happen if we turn our beakers upside down?"

Ask students to record their hypotheses in their notebooks (They do not need to be budding Einsteins to hypothesise that the water will fall out) and to explain why they think the water will cascade all over the floor.

Proceed with the demonstration so that the pupils can observe what happens.

** Now comes the interesting part of the lesson **

Ask another predictive question. "What will happen if we fill the beaker with water, place a piece of paper over the top of the beaker and then turn the beaker upside down?"

7. Ask students to record their hypotheses in their notebooks.

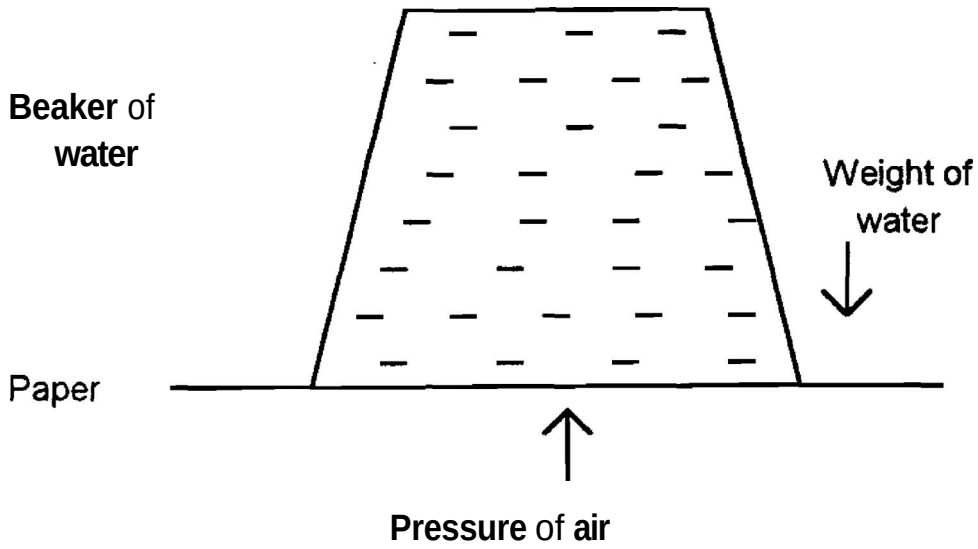
8. Proceed with the experiment once again so that the pupils can observe what happens (see figure 1)

In the light of the amazing outcome i.e. the water does not fall out (try it yourself and see !!), have pupils evaluate their various hypotheses.

10. Draw conclusions based on the observed outcome i.e. the pressure of air pressing upwards on the piece of paper, is greater than the weight of water pressing downwards on the same piece of paper.

11. Application: ask pupils to suggest alternative procedures or cite additional evidence from every-day experience to illustrate that air exerts pressure.

**Figure 1**




## Conclusion

Students at all age levels tend to make greater academic progress when teachers use intellectually challenging teaching techniques which promote cognitive growth. Challenging tasks presented by the teacher through models of teaching like predictive inquiry encourage students to think creatively and critically.

Although the Predictive Inquiry Model was originally developed for the natural sciences, its procedures are usable in all subject areas. Any topic that can be formulated as a puzzling situation is a candidate for inquiry training. In literature, murder mysteries and science fiction stories or plots make excellent puzzling situations. Newspaper articles about bizarre or improbable situations may be u'sed to construct stimulus events. The social sciences also offer numerous possibilities for inquiry training. For example: What would happen if the polar ice caps melted; or the ozone layer was depleted?

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