

THE TYPES OF SCIENTIFIC INVESTIGATION USED IN METHODOLOGY

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ABSTRACT: This article is about a scientific investigation and its types used in methodology. There are some ideas how to conduct a scientific investigation

KEYWORDS: investigation, scientific method, experimentation, hypothesis, focus, observation, process, evaluate, overview.

INTRODUCTION. There are many things in the world that are investigated, has to be investigated and will be investigated. The range of matters that are the subject of investigations has become broader. The benefits of conducting a proper investigation and the potential liability for mistakes during investigations are great. Investigations help resolve conflict and can be decisive in many cases. Hence we need the scientific investigation.

The scientific method has its basis in empirical research. Empirical research generates knowledge derived from observation or experimentation as opposed to theory. Empirical research uses inductive reasoning to draw conclusions about the experimentation and observations. Inductive reasoning is where specific observations or measurements are made in order to develop broader conclusions, generalizations and theories. For example, scientists conduct experiments and collect data to help answer scientific questions and solve problems. Deductive reasoning is where one starts thinking about generalizations, then proceeds toward the specifics of how to prove or implement the generalizations. Of course many researchers use both inductive and deductive reasoning in approaching a problem.

There are three types of scientific investigations: descriptive, comparative and experimental.

Descriptive Investigation - involve describe and/or quantifying parts of a natural system.

Comparative Investigation - involve collecting data on different populations/organisms, under different conditions to make a comparison

Experimental Investigation - involve a process in which a "fair test" is designed in which variables are actively manipulated, controlled, and measured in an effort to gather evidence to support or refute a casual relationship. [<https://www.texasgateway.org/resource/types-science-investigations>]

There are two basic types of research associated with the scientific method.

1) Quantitative Research

Quantitative research is based on collecting facts and figures. This type research is common in subjects such as biology.

2) Qualitative Research

Qualitative research is based on collecting opinions and attitudes. This type research is common in the social sciences. [<http://generalhorticulture.tamu.edu/LearningCommunity/ScientificMethod.htm>]

The scientific investigations are decided by the five steps. Without it, it would be impossible for any scientist to replicate the experiment. These standard steps ensure that the test is being impartial and the result is based on proper research.

1) Questioning - It is a first step of any scientific investigation. While understanding a concept you get into lot of doubts, problems etc. In questioning the problem is exhibited in the form of questioning.

2) Gathering Information - The next step is gathering out the information. It is the way to do back ground research where science journals and some similar experiments are referred to come to an inference. It is also known as way to perform back ground research.

3) Hypothesis - The Hypothesis is the kind of prediction of outcome based on studying the information. It is a kind of educated guess that tells what results are expected by the experiment.

4) Test the hypothesis - The hypothesis is tested by designing proper experimental tool. Following proper guidelines the experiment is performed and results are tested.

5) Conclusion - The data collected in the experiment decides whether the experiment works proves or disproves the result. Hence we get the conclusion which either proves or disproves the hypothesis. [<https://physics.tutorvista.com/scientific-methods/scientific-investigation.html>]

A SCIENTIFIC INVESTIGATION

Considering the nature of scientific activity should help students to identify and consolidate ideas that will be useful in the choice and development of a good investigation. Judicial questioning can be used to help students explore ideas in more depth, e.g. what is a hypothesis? What makes a hypothesis a good one? And so on.

The brainstorm and subsequent discussion should raise issues such as:

- science is about solving problems
- you have to test things to get and record the evidence
- the scientist makes a prediction based on current knowledge and writes this as a hypothesis – a testable statement
- the hypothesis is tested by designing and conducting an experiment, which will usually change one factor at a time with all the other conditions constant or controlled (so called ‘fair test’)
- scientific investigations look for cause and effect relationships, i.e. variation in one factor causes variation in another in a predictable way
- your experiment needs to be repeatable and testable by other scientists, so you have to give full practical details
- results have to be obtained and communicated accurately [Scientific investigations: Getting started: page 13 of 17]

In conclusion the major advantage of the scientific method is that the data it collects is empirical. The information is gained through direct observations and experiments. This is an advantage as it allows observer to make claims about the truth of the theory. This is an advantage over other non-scientific methods that are based on subjective arguments and unfalsified beliefs.

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