

Logic of the Scientific Method

ScWk 240 -- Session 2 Slides

Introduction to the Scientific Method

Basic Requirements:

- Uses logical, problem solving techniques
- Carefully organized
- Builds on existing info
- Uses credible measures
- Can be replicated



Methods of Scientific Inquiry

Observation: *vs.* *Inference:*



Uses our senses to gather information

Qualitative: uses our five senses

Quantitative: uses numbers



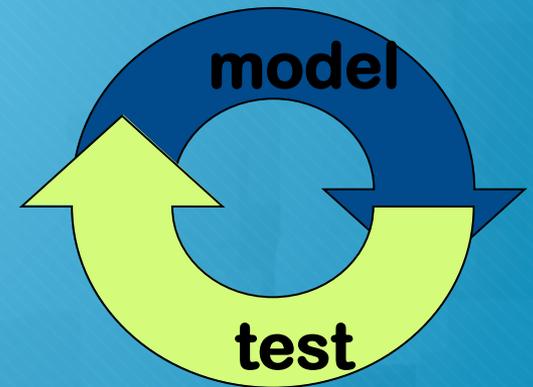
A logical interpretation of events based on prior knowledge or opinion

Educated guess



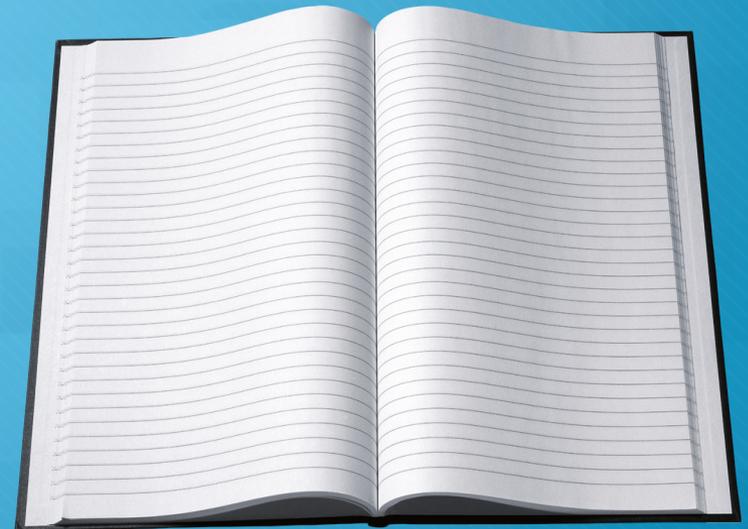
Steps in the Scientific Method

1. **Observe** an event.
2. Develop a **model** (or **hypothesis**) which makes a **prediction**.
3. **Test** the prediction.
4. **Observe** the result.
5. **Revise** the hypothesis.
6. **Repeat** as needed.
7. A **successful** hypothesis becomes a **Scientific Theory**.



Gathering Information

- Search for references to conduct background research:
 - Books
 - Journals
 - Professional Publications
 - Internet
 - Other Reputable Media
 - Videos
 - Interview Experts



Formulate a Hypothesis



Hypothesis: an educated guess about the relationship between the independent and dependent variables.

- Possible answer to a question that can be tested
- based on observations and knowledge
- “If” “Then” “Because” statement



Theories

A theory is a highly successful hypothesis.

All hypotheses make predictions.

All theories make predictions.

All theories can be tested.



Result: Any scientific theory is subject to change as our ability to make tests, or make observations of a test's results, improves with time.

Types of Logic: Inductive vs. Deductive

Inductive Reasoning:

- Derives generalizations based on specific observations and measures



Deductive Reasoning:

- Derives specific predictions from general premise



Types of Variables



Independent (manipulated) variable: condition, event, or method under study,

Dependent (responding) variable: condition that could change under the influence of the independent variable.

Controlled variable: conditions which could effect the outcome of the study and often need to be controlled or analyzed.

Types of Social Work Research

- **Impact/Outcome Studies**
- **Program Evaluation**
- **Needs Assessment**
- **Process Evaluation**



Political Issues in Research



Ethics and Human Subjects Concerns

Policy Mandates and Directives on Programs

Securing Administrative Approval and Cooperation

Money, Time, and Agency Operations

Push for Evidence-Based Practice and Outcomes

Scientific Method: Summary

- **Devise a Problem/Question**
- **Observation/Research/Literature Search**
- **Formulate a Hypothesis**
- **Implement the Project**
- **Collect and Analyze the Results**
- **Devise Conclusion(s)**
- **Communicate/Disseminate the Results**

