

Chapter Two

APPLYING SCIENTIFIC THINKING

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Statement of research
problem

RELEVANT
THEORY

EXISTING
KNOWLEDGE

Hypothesis:
variables
operational definition

CHARACTERISTIC OF GOOD RESEARCH PROBLEM

- The question is feasible (it can be investigated without an undue amount of time, energy and money)
- The question is clear (most people would agree as to what the key words in the question mean)
- The question is significant (contribute important knowledge)
- The question is ethical (not involve in harm or damage of human being)

HIPOTESIS

- Hipotesis: prediksi tentang fenomena atau dugaan yang akan diuji kebenarannya

Klasifikasi Hipotesis

Hipotesis deskriptif

- Pernyataan ttg keberadaan sebuah variabel tunggal

Hipotesis korelasi

- Hipotesis yang menyatakan hubungan dua buah variabel yang terjadi bersamaan tanpa mengetahui mana yang mempengaruhi yang lainnya.

Klasifikasi Hipotesis

Hipotesis
causal/
explanatory

- Hipotesis yang menyatakan hubungan suatu variabel menyebabkan perubahan variabel yang lain.

Definition of variable

- Variable is a characteristic that takes on different value or conditions for different individuals
- A constant is characteristic or condition that is the same for individual in the study

Type of Variables

- Dependent variables
- Independent variable

The value of dependent variable depend on the independent variable

Independent
Variable

Control
Variable

dependent
Variable

Type of variables

- Control variable: variable other than independent variables of primary interest whose effects are determined by researcher.
- Moderator variable
- Intervening variable

Exercises

- A study is conducted to determine the effects of sets of instructional materials on fourth-grade reading achievement. Three random samples of fourth grade boys are selected within the same school. These three groups are then taught by different teachers, each using one set of instructional materials. At the end of 10 weeks of instruction, the students are tested on reading achievement.

Exercises

- Identify the constant
- Independent variables
- Dependent variables

Exercises

- Two chemistry teachers in a high school are interested in determining whether varying amounts of lab work will affect performance on chemistry exam. With flexible scheduling, students may spend 1, 2 or 3 hours per week in lab work. Develop a statement of the research problem. Identify the dependent variable, independent.

Measurement Scales

Nominal

- classification
- Gender

Ordinal

- Classification, With order
- Ex: attitude toward school.
Unfavorable, neutral, favorable

Interval

- Classification, With order. Equal distance
- Ex; IQ

Ratio

- Classification, with order, equal distance, true zero point
- Ex; Financial ratio, weight

Sources of Knowledge

- Empiricists attempt to describe, explain, and make predictions through observation
- Rationalists believe all knowledge can be deduced from known laws or basic truths of nature
- Authorities serve as important sources of knowledge, but should be judged on integrity and willingness to present a balanced case

The Essential Tenets of Science

- Direct observation of phenomena
- Clearly defined variables, methods, and procedures
- Empirically testable hypotheses
- Ability to rule out rival hypotheses
- Statistical justification of conclusions
- Self-correcting process

Ways to Communicate

- Exposition
 - descriptive statements that merely state and do not give reason
- Argument
 - allows us to explain, interpret, defend, challenge, and explore meaning

Important Arguments in Research

- *Deduction* is a form of inference that purports to be conclusive
- *Induction* draws conclusions from one or more particular facts

The Building Blocks of Theory

- Concepts
- Constructs
- Definitions
- Variables
- Propositions and Hypotheses
- Theories
- Models

Understanding Concepts

- A *concept* is a bundle of meanings or characteristics associated with certain events, objects, conditions, situations, and behaviors
- Concepts have been developed over time through shared usage

Understanding Concepts

- The success of research hinges on:
 - how clearly we conceptualize
 - how well others understand the concepts we use

What is a Construct?

- A *construct* is an image or idea specifically invented for a given research and/or theory-building purpose.

Types of Variables

- Independent
- Dependent
- Moderating
- Extraneous
- Intervening

The Role of the Hypothesis

- Guides the direction of the study
- Identifies facts that are relevant
- Suggests which form of research design is appropriate
- Provides a framework for organizing the conclusions that result

What is a Good Hypothesis?

- A good hypothesis should fulfill three conditions:
 - Must be adequate for its purpose
 - Must be testable
 - Must be better than its rivals

The Value of a Theory

- Narrows the range of facts we need to study
- Suggests which research approaches will yield the greatest meaning
- Suggests a data classification system
- Summarizes what is known about an object of study
- Predicts further facts that should be found