Chapter Two

APPLYING SCIENTIFIC THINKING

Dr Ratna Candra Sari
Email:
ratna_candrasari@uny.ac.id
Statement of research problem

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 tentang 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 group are than 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 flexibility 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

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<th>Scale</th>
<th>Description</th>
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| **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.
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