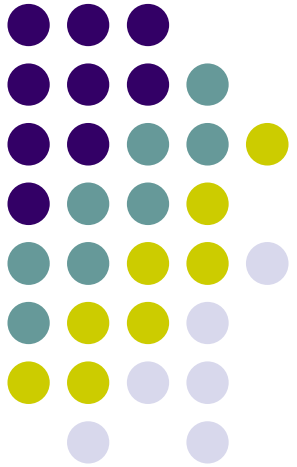
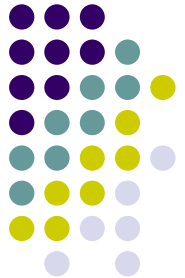
Chapter 1
The Nature of Research

Fraenkel & Wallen (2006). *How to design and evaluate research in education (6th ed.).* Boston: McGraw-Hill.

Prof. Dr. Sabri KOÇ

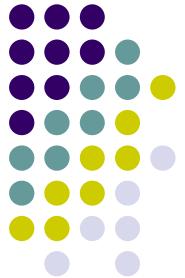


The nature of research



- Examples of educational concerns
- Why research is of value
- Ways of knowing
- Types of research
- General research types
- Critical analysis of research
- Overview of the Research Process

Examples of educational concerns



- Some examples of educational concerns
  - **A high school principal may want to raise the motivation of her teachers**
  - **A teacher might want to find out if discussions are more effective than lectures in motivating students to learn concepts in biology**
  - **A school principal may want to devise ways of getting parents involved in school related activities**

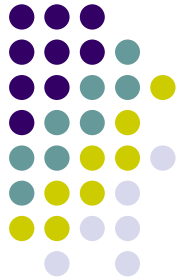
TO FIND THE ANSWERS TO THESE....

Why research is of value then?

- Consult experts
- Review books and/or articles
- Question or observe colleagues

BUT THESE MAY NOT ALWAYS REFLECT THE TRUTH
THEREFORE WE NEED SCIENTIFIC WAYS OF PROVIDING ACCURATE AND RELIABLE INFORMATION

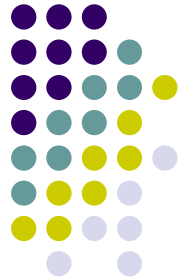
WAYS OF KNOWING



- Sensory experience
- Agreement with others
- Expert opinion
- Logic
- The scientific method

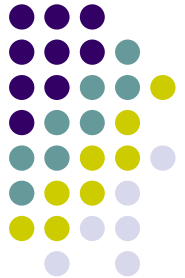
  Science is a method of knowing, which is a testing of ideas.

The Scientific Method (01)



- What we see/observe are guesses or hunches (strong feelings without evidence) as scientists could say “hypotheses”
- Put each of these to a rigorous test if they hold up under controlled conditions
- Observe carefully and systematically
- All aspects of the investigation are described in sufficient detail so that they can be repeated by any who questions the results provided.

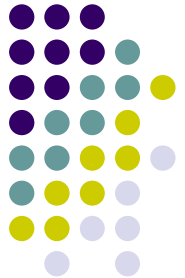
The Scientific Method (02)



- **The procedures of scientific inquiry (5 steps)**

1. There is a problem of some sort bothering us
2. Define the problem precisely or questions to be answered to become clearer about the purpose of the study
3. We attempt to determine what kinds of information would solve the problem – here spelling out the details of information-gathering is a major aspect of planning a research study.
4. Decide, as far as possible, how we will organize the information we obtain.
5. After the information has been collected and analyzed, it must be interpreted.

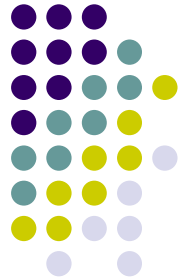
Order of scientific research



The general order of scientific research is:

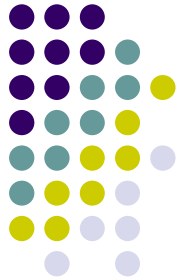
- **Identifying a problem or question**
- **Clarifying the problem**
- **Determining the information needed and how to obtain it**
- **Organizing the information**
- **Interpreting the results**

IMPLICATIONS OF EDUCATIONAL RESEARCH



1. Difficulty in providing generalized rules and laws in education due to a variety of factors: geography, time, group/individual differences
2. Intensive study of the exceptional or the unusual rather than the trivial or the incidental
3. Greater emphasis on long term-term studies (longitudinal) rather than short-term research

TYPES OF RESEARCH



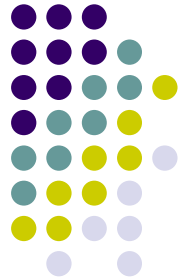
A. QUANTITATIVE RESEARCH

- Experimental
- Correlational
- Causal-comparative
- Survey

B. QUALITATIVE RESEARCH

- Ethnographic
- Historical
- Action

1. EXPERIMENTAL RESEARCH



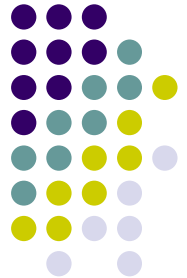
- EXTRANEOUS VARIABLES

Comparing the effect of different teaching methods on student achievement or student attitudes

- SINGLE SUBJECT RESEARCH
- Involves intensive study of a single individual over time.

  This method is appropriate when individuals with special characteristics are studied

2. CORRELATIONAL RESEARCH (01)



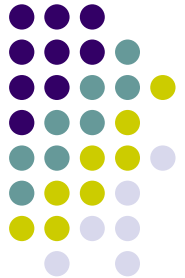
- Determines relationships among two or more variables to find their implications for cause and effect

  For example when a researcher wants to find out why some students have problems in learning “statistics”.

  Suggest corrective measures.

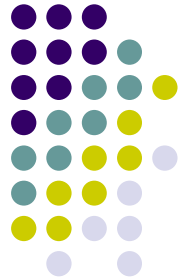
  Researcher has to find..

2. CORRELATIONAL RESEARCH (02)



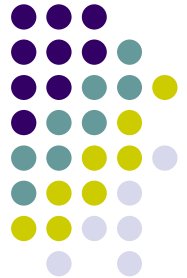
- What factors contribute to the achievement of the other students (ex. Computational skills, ability to solve word problems, understanding of math concepts, verbal abilities, study habits, aspects of their backgrounds, early experiences with math courses and even math teachers
- Through comparing these points researcher can determine factors that cause students get low grades in “statistics”

2. CORRELATIONAL RESEARCH (03)



- In correlational research, there is no manipulation or intervention on the part of the researcher but just to administer the instruments necessary to collect the data
- This approach is used if the researcher wants to look for and describe relationships among naturally occuring phenomena without altering the phenomena

3. CAUSAL-COMPARATIVE RESEARCH (01)

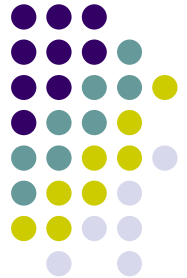


- Helps to determine the cause for or the consequences of differences between groups of people

  Ex. When a researcher wants to determine whether students from low-income families do poorly in a particuar course than students from high-income families

  The researcher can conclude there is a difference but cannot elaborate on the causes. These causes can stem from:

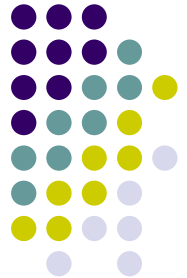
3. CAUSAL-COMPARATIVE RESEARCH (02)



- Difference in home environment
- Status in society (?)
- Or some unidentified factor

- Therefore causal comparative research is of value in identifying possible causes of observed variations.

4. SURVEY RESEARCH (01)

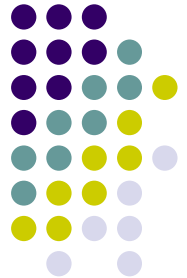


- Aims to collect data to determine the specific characteristics

  Ex. A dean may want to find out how his faculty feels about his administrative policies.

  As a tool to solicit answers, interviews or questionnaires are resorted to...

4. SURVEY RESEARCH (02)



- Problems encountered in survey type research are:
    a. Questions to be answered should be clear and not misleading
    b. Repondents need to answer thoughtfully and honestly
    c. Questionnaires need to be compeleted and returned

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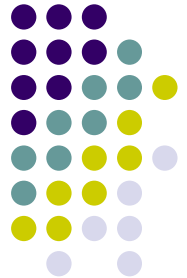
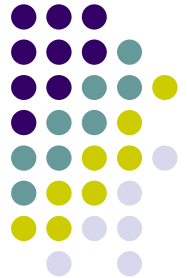
4. SURVEY RESEARCH (03)



- The advantage of survey type research is that a lot of information is obtained from a large sample of individuals
- Interview is advantageous as the open ended questions yield to various responses, explanations, and even to follow-up questions

5. ETHNOGRAPHIC RESEARCH (01)

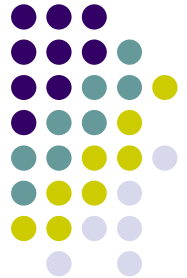


- Such research is carried out to document or display the everyday experiences of individuals by observing and interviewing them

  Ex. Observing an elementary school classroom: students and the teacher

  The teacher can be interviewed to portray:

5. ETHNOGRAPHIC RESEARCH (02)



- Social atmosphere of the classroom
- Intellectual and emotional experiences of students
- Manner in which teacher acts toward and reacts to students of different ethnicities, sexes or abilities
- How the rules of the class are learned, modified and enforced
- Kinds of questions asked by both students and teacher

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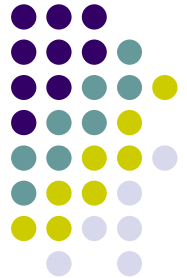
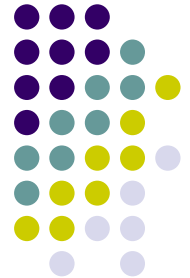
5. ETHNOGRAPHIC RESEARCH (03)



- The data to include descriptions of students related to classroom activities:
  - Audio-tapes of student-teacher conferences
  - Videotapes of classroom discussions
  - Examples of teacher lesson plans and student work
  - Sociograms that show power relations in the class

5. APPROACHES TO ETHNOGRAPHIC RESEARCH (04)



- *Biography:* focuses on significant aspects of, for example, a school administrator's life to clarify meanings and interpretations
- *Phenomenology:* focuses on a particular situation to collect data through in-depth interviews and identifies what is common. (Ex. A conflict among the members of the board of trustees)

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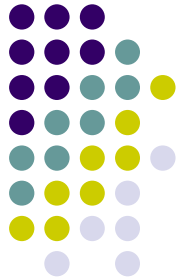
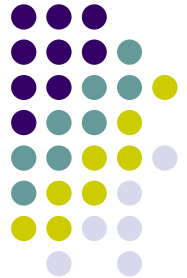
5. ETHNOGRAPHIC RESEARCH (05)



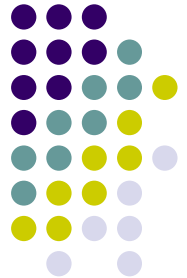
- *Case study:* individual, group or an example is studied extensively, varied data are collected, interpretations are formulated to a specific case
- *Grounded theory:* the purpose is to develop theory inductively from data. For ex. A particular behavior displayed by a teacher at a school/ a student in one specific course

6. HISTORICAL RESEARCH



- Historical research focuses primarily on the *past* with no manipulation or control of variables like there is in experimental research.
- Historical research is the systematic collection and evaluation of data to describe, explain, and thereby understand actions or events that occurred sometime in the past.

7. ACTION RESEARCH



- The objective is to find solutions to change the already existing pattern/conditions in a particular situation the researcher is involved

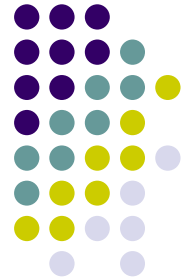
  Ex. improving learning strategies

  improving teaching strategies

  increasing student motivation

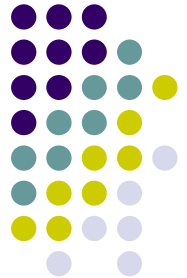
  ("participants" or "stakeholders", "research team" are commonly used terms)

THE RESEARCH PROBLEM



- What is a research problem?
- Research questions
- Research questions often investigate relationships
- Characteristics of good research questions
  - *should be **feasible***
  - *should be **clear***
  - *should be **significant***
  - *should be **ethical***

DEFINING TERMS IN A RESEARCH STUDY

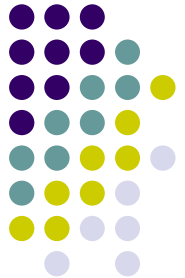


1. CONSTITUTIVE DEFINITION

2. CLARIFYING BY EXAMPLE

3. OPERATIONAL DEFINITIONS

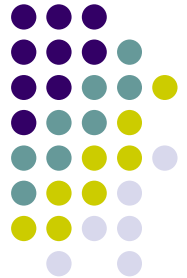
CONSTITUTIVE DEFINITION



- It is the dictionary approach, i.e., the definition found in a dictionary. There are ambiguities at times hence the saying “the message sent is the message received” is not totally correct.
- Ex. How is “motivated to learn” best defined?
  - 1. works hard (2)
  - 2. is eager and enthusiastic (3)
  - 3. sustains attention to a task (1)

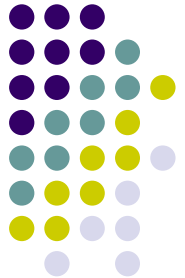
  Therefore such type of definiton has LIMITATIONS.

CLARIFYING BY EXAMPLE



- Researcher tries to find other situations relevant to the primary statement and exploit it by giving examples. Still it may still not lead to clarification of the doubts

OPERATIONAL DEFINITIONS (01)



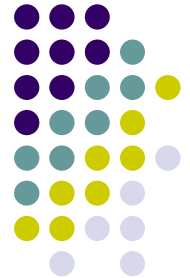
- Specify the actions to measure or identify the term

  Ex. “a humanistic classroom”

  any classroom identified by experts as an example of a humanistic classroom

  any classroom judged by an observer to possess the following characteristics:

OPERATIONAL DEFINITIONS (02)



A. No more than three children working with the same materials at the same time

B. The teacher never spending more than 20 min. a day in addressing the group

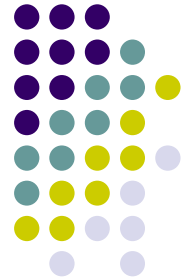
C. At least half of every class period is devoted to project work

D. Several materials available per child in class

E. Non-traditional seating arrangement

F. Frequent discussions allowing students to speak out their thoughts

OPERATIONAL DEFINITIONS (03)



- Operational defining helps to clarify meaning
- Yet on its own, it has its limitations and therefore should be accompanied by constitutive definition

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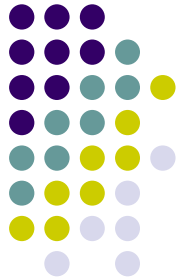
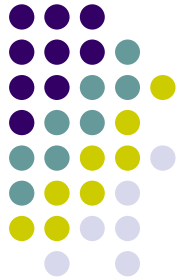
Which of the following possible definitions of "motivated to learn mathematics" are operational?



1. as shown by enthusiasm in class
2. as judged by the student's math teacher using a rating scale she developed
3. as measured by the "math interest" questionnare
4. as shown by attention to math tasks in class
5. as reflected by achievement in mathematics
6. as indicated by records showing enrollment in math electives
7. as shown by effort expended in class
8. as demonstrated by optional assignments completed
9. as demonstrated by reading math books outside of class
10. as observed by teacher aides using the "math interest" observation record

TYPE OF DEFINITIONS



- Operational definitions are:

  2, 3, 6, 8, 10

- Non-operational definitions are:

  1, 4, 5, 7, 9

  because the activities or operations for identifying the behavior have not been specified