



Educational Research

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Overview

- Four sections of this presentation
 - An overview of the scientific method and educational research
 - The classification of types of research by purpose
 - The classification of types of research by method
 - Examples of types of research



Ways of Knowing

- Five ways we can *know* something
 - Personal experience
 - Tradition
 - Experts and authorities
 - Logic
 - Inductive
 - Deductive
 - The scientific method



Ways of Knowing

- Personal experience
 - Relying on one's knowledge of prior experiences
 - Limitations
 - How one is affected by an event depends on who one is
 - One frequently needs to know something that cannot be learned through experience



Ways of Knowing

- Tradition
 - Doing things as they have always been done
 - Limitations
 - Traditions are often based on an idealized past
 - Traditions can be distant from current realities and the complexities associated with them
- Experts or authorities
 - Relying on the expertise or authority of others
 - Limitations
 - Experts can be wrong
 - Experts can disagree among themselves, as in a “second opinion”



Ways of Knowing

- Inductive reasoning
 - Reasoning from the specific to the general
 - Limitations
 - In order to be certain of a conclusion one must observe all examples
 - All examples can be observed only in very limited situations where there are few members of the group



Ways of Knowing

- Deductive reasoning
 - Reasoning from the general to the specific
 - Limitations
 - You must begin with true premises in order to arrive at true conclusions
 - Deductive reasoning only organizes what is already known



The Scientific Method

- The goal of the scientific method is to explain, predict, and/or control phenomena
- This involves the acquisition of knowledge and the development and testing of theory
- The use of the scientific method is more efficient and reliable than any other source of knowledge



The Scientific Method

- Five steps in the scientific method
 - Recognition and definition of the problem
 - Formulation of hypotheses
 - Collection of data
 - Analysis of data
 - Stating conclusions



The Scientific Method

- Limitations of the scientific method
 - Inability to answer value-based questions involving “should”
 - Inability to capture the full richness and complexities of the participants
 - Limitations of our measurement instruments
 - Ethical and legal responsibilities



Educational Research

- The application of the scientific method to study *educational* problems
- The goal is to explain, predict, and/or control *educational* phenomena



Educational Research

- Steps for conducting educational research
 - Selection of a problem
 - Use of specific research procedures to design and collect data
 - Analysis of data
 - Statement of conclusions based on the results of the data analyses
- Parallels the steps in the scientific method



Educational Research

- Difficulties conducting educational research
 - Involves human beings and the complexities associated with them
 - Difficulties generalizing from specific studies
 - Problems when imposing sufficient controls to conduct research in educational settings
 - Complications when observing in educational settings
 - Indirect measurement of the variables being studied



Classifying Research

- Two helpful ways to view research
 - Purpose
 - The degree of direct applicability of research to educational practices and settings
 - Method
 - The overall strategies followed to collect and analyze data



The Purposes of Research

- Five categories
 - Basic
 - Applied
 - Evaluation
 - Research and development (R & D)
 - Action



The Purposes of Research

- Basic research
 - Collection and analysis of data to develop or enhance theory
 - Examples related to **learning theory**
 - Piaget
 - Constructivism
 - Mastery learning
 - Gardner's multiple intelligences



The Purposes of Research

- Applied research
 - Collection and analysis of data to examine the usefulness of theory in solving practical educational problems
 - Examples
 - Developing a seventh grade social studies curriculum around a problem-solving approach to learning
 - Examining the effectiveness of a computer-based algebra program developed around a mastery learning approach
 - Accommodating varied learning styles when teaching lessons in modern literature



The Purposes of Research

- The interaction of basic and applied research
 - Basic research provides the theory that produces the concepts for solving educational problems
 - Applied research provides the data to help support, guide, and revise the development theor



The Purposes of Research

- Evaluation research
 - The collection and analysis of data to make decisions related to the merit or worth of a specific program
 - Merit relates to a program accomplishing what it was supposed to accomplish
 - Worth relates to the value attached to a program by those using it



The Purposes of Research

- Evaluation research
 - Types of evaluation
 - Formative evaluation is designed to inform and improve a program while it is being developed or implemented
 - Summative evaluation is designed to make decisions regarding the overall quality of the program being evaluated



The Purposes of Research

- Evaluation research
 - Examples
 - The computerized algebra program being used in Williams Middle School has been installed properly, is being used properly, and student achievement is increasing as a result of its use
 - The computerized algebra program being used in Williams Middle School is perceived to be an efficient and effective expenditure of district funds



The Purposes of Research

- Research and development
 - The development of effective products for use in schools
 - Examples
 - The development of the software to create a computerized algebra program that incorporates an individualized mastery learning approach to teaching basic algebraic concepts
 - The development of a *Smart Board* to enhance a teacher's use of technology in the classroom



The Purposes of Research

- Action research

- The collection and analysis of data to provide a solution to the practical, valued problems of educators within their own school or organization
- Examples
 - How can our college move to a performance based model for undergraduate teacher preparation programs?
 - How can disciplinary policies be enforced consistently in our school?



Research Methods

- Two general categories of methods currently being used in educational research
 - Quantitative
 - Qualitative



Quantitative Methods

- General purpose
 - Collect and analyze data to explain, predict, or control phenomena of interest
 - Describe current conditions
 - Investigate relationships
 - Study causes and effects
- Assumptions of the researcher
 - We live in a stable, uniform, and coherent world
 - We can measure, understand, and generalize about our world
 - Generally regarded as a *positivistic* perspective



Quantitative Methods

- Characteristics
 - Numerical data
 - Use of formally stated hypotheses and procedures
 - Use of controls to minimize the effects of factors that could interfere with the outcome of the research
 - Large numbers of participating subjects
 - An objective, detached researcher
 - Use of pencil and paper tests, questionnaires, etc.



Quantitative Methods

- Five basic designs
 - Descriptive
 - Correlational
 - Causal-comparative
 - Experimental
 - Single subject



Quantitative Designs

- Descriptive
 - Purpose – to describe the current status of a variable of interest to the researcher
 - Examples
 - How many students drop out of school in Louisiana?
 - What are the attitudes of parents, students, and teachers concerning an extended school year?
 - What kinds of activities typically occur in sixth-grade art classes, and how frequently does each occur?
 - To what extent are elementary teachers using math manipulatives?



Quantitative Designs

- Correlational
 - Purpose – to ascertain the extent to which two or more variables are statistically related
 - Examples
 - What is the relationship between ACT scores and freshman grades?
 - Is a teacher's sense of efficacy related to his/her effectiveness?
 - Do significant relationships exist between the types of activities used in math classrooms and student achievement?
 - This design does *NOT* imply causation



Quantitative Designs

- Causal-comparative
 - Purpose – to explore relationships among variables that cannot be actively manipulated or controlled by the researcher
 - Examples
 - What is the effect of part-time employment on the achievement of high school students?
 - What characteristics differentiate students who drop out from those who do not?
 - What is the effect of attending a magnet school on student attitude?
 - An important characteristic is that the independent variable has already been manipulated



Quantitative Designs

- Experimental

- Purpose – to establish cause and effect relationships between variables
- Examples
 - What is the effect of teaching with (1) a co-operative groups strategy or (2) a traditional lecture approach on students' achievement?
 - What is the effect of teaching with manipulatives vs. a traditional algorithm approach on students' test scores?
- The important characteristics are that the researcher manipulates the independent variable and controls extraneous variables



Quantitative Designs

- Single subject
 - Purpose – to investigate cause and effect relationships with samples of one (1)
 - Examples
 - What is the effect of a behavior modification program on John's conduct in class?
 - What is the effect of a behavioral training program on Joan's ability to complete her performance tasks?
 - The important characteristic is the use of specific interventions to cause behavioral changes in low incidence populations (e.g., special education)



Qualitative Methods

- **General purpose**

- To probe deeply into the research setting to obtain in-depth understandings about the way things are, why they are like that, and how participants perceive them
 - The need to create a sustained, in-depth, in context study that allows the researcher to uncover subtle, less overt personal understandings

- **Assumptions of the researcher**

- All meaning is situated in a particular perspective or context
- Different people and groups often have different perspectives and contexts, so there are many different meanings in the world
- Generally regarded as a post-positivistic perspective



Qualitative Methods

■ Characteristics

- There are no hypotheses guiding the researcher, rather a general issue known as the *foreshadowed problem* suggests the general issues of concern
- Problems and methods tend to evolve over the course of the study as understanding of the research context and participants deepens
- Phenomena are examined as they exist in a natural context, and they are viewed from the participants' perspectives
- There are few participants involved in the study
- Data analysis is interpretative in nature
- The researcher interacts extensively with the participants



Qualitative Methods

- Two basic designs
 - Narrative
 - Ethnography



Qualitative Designs

- Narrative

- Purpose – focus on studying a single person and gathering data through the collection of stories that are used to construct a narrative about the individual's experience and the meanings he/she attributes to them
- Examples
 - What are the experiences of a veteran teacher who has been moved into an administrative position in her school?
 - What does "inclusion" mean to a special needs child who is placed in a regular education classroom?



Qualitative Designs

- Ethnography
 - Purpose – to obtain an understanding of the shared beliefs and practices of a particular group or culture
 - Examples
 - What is the nature of the problems teachers encounter when they begin using a constructivist approach to instruction after having taught using a very traditional approach for ten years?
 - Why does a sense of failure permeate everything about this particular high school?



Quantitative and Qualitative Methods

- Complementary nature of quantitative and qualitative approaches
 - Different purposes of research
 - Explanatory
 - Exploratory
 - Consideration of the strengths and weaknesses of different approaches for specific purposes
- Quantitative versus Qualitative Research



Quantitative and Qualitative Methods

- The ultimate goal when choosing a design is to produce a credible answer to the research question
 - The research question drives the choice of a research design
 - The characteristics of specific designs suggest they will produce more credible answers to specific types of research questions than other designs
 - Specific purposes
 - Specific procedures and analyses for each design



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