EDTC622: Textbook Notes

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Chapter 1: Nature and Rules of Operation

The Process of Educational Research

- *A Concern Exists.* A concern is identified for which there is no ready answer.
- *The Concern is Addressed*. Using the following steps:
  1. The concern is clarified and stated succinctly, after which it becomes known as the research problem.
  2. One or more main research questions or hypotheses are posed to guide the investigation. Research questions indicate what the research actually hopes to determine. Hypotheses are statemnts that can be tested statistically.
  3. Information , referred to as data, pertinent to the questions or hypotheses is sought.
  4. As data are accomulated, they are summarized, organized and analysed. These procedures are then presented as findings.
  5. An interpretation of the data, called a conclusion, is presented in terms of the original questions or hypotheses.

Educational research is simply scientific research applied to education.

Rules of Operation in Educational Research

Legal Principles

Rule 1: Protection. Protect individuals against physical, mental, or emotional harm.

Rule 2: Confidentiality. Without express permission to the contrary, the anonymity of the participants is to be maintained.

Ethical Principles

[1] Image: Microsoft Clip-Art Online, 9/14/2003 2:02:49 PM

Rule 3: Beneficence. The researchers aim is to increase understanding and to promote opportunity and advancement for the population at large.

Rule 4: Honesty. Data is to be reported exactly as obtained and there are no exceptions to the collection procedure.

Rule 5: Accurate Disclosure. The participants must be informed accurately about the general topic of research and any unusual tasks in which they will be involved.

Philosophical Principles

Rule 6: Importance. Establish an educational need for the information and show how the research has the potential to supply the needed information.

Rule 7: Generalizability. The findings of the research can be applied or generalized to other individuals and settings. More importantly, the degree to which the sample being studied represents the larger population to which the sample belongs. NOTE: Does not apply to historical and action research.

Rule 8: Replicability. Keep records of exactly what was done and why, in each phase of the investigation.

Rule 9: Probability. Research conclusions hinge not on absolute certainty but on probability.

Procedural Principles

Rule 10: Researchablity. The following questions must be satisfied:

a) Can the scientific method be applied or reworded to apply to the research topic?

b) Is appropriate data available?

c) Can the data be collected within the given time, physical and financial contraints?

Rule 11: Parsimony. Only necessary data should be collected and the process kept efficient. Data analysis should be to the point.

Rule 12: Credibility. The following criteria must be met:

a) The topic significant and researchable.

b) The Rules of Operation must be adhered to.

c) The data are reliable and consistant.

d) The analysis follows appropriate methods.

e) The findings must be supported by the data.

f) The conclusions must be persuasive, clear, and accurate.

Rule 13: Rival Explanations. Should anticipate analysis by peers and take measures to forstall other possible explanations.

Chapter 2: Types of Educational Research

Variables and Educational Research

- Variables are sets of data that differ from one individual, object or procedure to another. A trait that does not differ is called a Constant.
    1. Continuous variables show gradual differences.
    2. Discrete variables are categorical in nature.
    3. Dichotomous variables are special cases of discrete variables with only two possible categories.

Independent, Dependant and Confounding Variables

- You can not have an independent variable without a dependent variable, and visa-versa.
- The independent variable precedes in time and exerts influence on the dependent variable, which may then change when influenced by the independent variable.
- Confounding variables are traits or conditions, whose presence may or may no be recognized by the researcher, that may taint the research outcomes.
- Types of confounding variables include:
    1. Intervening – innate traits such as motivation and intelligence of participants
    2. Organismic – relatively permanent physical traits or conditions that can not be changed easily
    3. Extraneous – temporary conditions in nature, such as fatigue, distraction, excitement, discomfort, and test anxiety

Types of Educational Research

Categorized by Practicality

- Basic Research. Often carried out to satisfy a strong interest about people, practices, and the natural world. Seldom conducted in education.
- Applied Research. Used to find practical solution to pressing problems.

Categorized by Methodology

- Any given investigation is characterized by two of these labels. [However,] a research study can not be qualitative and experimental.
- Qualitative research relies on narrative data
- Quantitative research relies on numerical data
- At times, qualitative and quantitative methods are used in the same study.

- Experimental research shows [very strong] cause-effect relationships. [It] is carefully designed to control the influence of all variables except those whose specific relationship is being explored.
- Non-experimental research is used to:
    1. depict people, events, situations, conditions and relationships as they currently exist or once existed,
    2. evaluate products or processes, and
    3. develop innovations.
- Non-experimental research is the rule rather than the execption in education.

Categorized by Questions Addressed

- Ethnographic research documents and explains social behavior within groups. It is nonexperimental, largely qualitative, and is heavily dependent on investigator perception.
- Historical research explores conditions, situations, events, or people of the paste. May be qualitative, quantitative, or both.
- Descriptive research depicts people, situation, events and conditions as they currently exist. May be qualitative, quantitative, or both. *Hypotheses* are frequently used as are research questions.
- Correlational research explores the degree of correlation between two or more variables. At least one pair of measures must be obtained for each participant. It is qualitative and non-experimental. Correlations merely show that two traits covary with each other [and provide] the ability to predict one of the variables from the other.
- Action research is done to improve conditions within a particular setting.
- Evaluation research is done to make judgements about the quality of particular programs, procedures, materials, and the like.
- Causal-Comparitive research… explores the influence of a preexisting condition on a variable. [It] suggests causality more persuasively than correlational research, but less persuasively that experimental research. [It] is nonexperimental and qualitative.
- Experimental research, which is usually quantitative, focuses on independent and dependent variables, called *cause* and *effect*, respectively. It is difficult to conduct in education.

Primary and Secondary Sources of Research Data

- The information on obtains about people, settings, objects, and procedures is called data, which can be recorded in verbal or numerical form.
- Primary data sources are highly valued because the firsthand information they supply tends to be more accurate than information obtained from secondary sources.

- Secondary data sources provide reports or interpretations of primary data, made by people who did not directly experience the events under consideration.
- Additional information sought by researchers includes the finding made in other investigations similar to their own. This information is used:
    1. to orient, guide and define the limits of the study,
    2. as secondary data possibly useful in the topic under investigation
    3. as primary data in what are called meta-analytical studies.
- Usually, however, other similar investigations only provide context and guidance for research.

Specific Sources of Research Data

- Participants – individuals from whom data are obtained.
- Procedures – formalized ways of operating in the educational setting.
- Settings – specific environments within which educational behavior occurs.
- Objects – inanimate things, such as books… and artifacts
- Records – highly summarized reports of performance, expenditures and the like.
- Documents – written papers and reports in their entirety.
- Informants – people, other than participants in the study, from whom opinion, informed views, and expert testimony are obtained.

Procedures Used in Collecting Data

- Verbal Description – a written or verbal description of what is observed. It is the primary method for ethnographic research and is o\frequently used in historical and descriptive research as well.
- Notation – making tally marks or brief written notes about people, objects, or other data sources. Notation is tied to observation.
- Recording – capturing scenes and interactions by means of camera or audio- or video tape. Recordings must be converted to words, scores, or tally marks before they can be analysed properly.
- Analysis – breaking entitities down into constuent parts to determine their composition, how they are organized, and how they function. *Objects* usually analysed include products made by students. *Relics* are objects from the past.
- Documents – published papers, curriculum guides, newspaper accounts, photographs, transcripts, etc. Provides much of the data for descriptive and historical research.
- Questioning – asking questions directly of participants and informants. Uses both surveys and personal interviews. *Surveys* typically make use of questionaires. *Interviews* allows the questioner to provide encouragement, ask probing

questions, and request additional information. [However,] the reliability of that information can be suspect.

- Testing – calls on participants to perform cognitive and/or psychomotor tasks. [It] is more frequently used to collect educational research data than any other method.
- Measurement – obtains data by checking performance or status against an established scale.

Qualities Required in Research Data

Authenticity and Believability

- Two informal means of assessing data:
    1. External criticism determines [whether] the data come from legitimate sources.
    2. Internal criticism is a personal evaluation of the belivabiltiy of the data
- All researchers should ask themselves:
    1. Is the data legitimate?
    2. Do the data come from real people, objects, or events?
    3. Are the data accurate?
    4. Is there possibility for bias?

Validity and Reliability

- Data are valid to the extent they depict or deal directly with the topic under consideration.
- Data are reliable to the extent they are consistent.
- (More in Chapter 7)

Additional Terminology

- People and other living thing, when being studied in research, are called participants.
- Particpants are usually, but not always, members of a samples, which are groups of individuals selected from a larger population.
- A population contains all the individuals withing certain descriptive parameters.
- Researchers use samples drawn from the larger population. [But,] the sample must fairly represent the population. Random samples are the preferred method, [but] when random selection is not possible or… not appropriate, other procedures are used to select samples. (More in Chapter 7)

Chapter 3: Selecting, Refining, and Proposing a Topic

Where to Find Good Research Topics

- Pick up any educational journal and you are likely to find several potential topics.
- Ask teachers what bothers them about teaching or what they would most like help with; their answers will identing a number of topic ideas.
- (refer to broad topic suggestions on p. 53-55)

- RE: The Relation of Human Growth
  Conferencing: How to maximize the value and improve the efficiency of personal conferences among teachers, students and parents.
- RE: Administrative Issue
  Effective Communication: There is an increasing need for better styles of communication and links among teachers, students, parents and other administrators.

Preliminary Considerations in Selecting Topics

- Evaluate your idea for a research topic against the following considerations:
  1. You should have a personal interest in the topic.
  2. The topic should be important and shold make a difference in some aspect of education.
  3. The newnes of a research topic may affect enthusiasm and satisfaction.
  4. Always five attention the the amound of time the investigation will take.
  5. Reflect on the difficulty of the topic.
  6. Consider the monetary costs that investigating the topic wouls entail.
  7. The Rules of Operation, especially the Ethical Issues.

Refining the Research Topic

- The topic must be properly sized… so that it can be dealt with efficiently under the constraints of time and resources, and the research can be done expediously.
- The topic needs to be clarified so that it states clearly
  1. the matter to be investigated,
  2. the variables to be investigated, and
  3. the participants, if any, that will be involved.
- A series of research questions or one or more hypotheses, or both, should be stated.
  - The advantage of research questions is that their several subquestions serve as a guide that helps lead… to a successful conclusion.
  - The advantage of hypotheses is that they can be tested statistically, thereby adding credibility to the research findings.
- Once these refinements have been made, the research topic becomes a *research problem*.

Some Necessary Terminology

- The *topic* refers to the matter to be investigated.

- A *broad topic* generally means that a topic is too large in scope for the time or resources available.
- *Narrowing the topic* refers to paring the topic down to manageable size.
- An *amorphous topic* is stated so vaguely that the it cannot be understood.
- *Clarifying the topic* involves changing the wording to make the topic understandable.
- The *problem* is the term used for a topic that has been refined appropriately for investigation.
    - Presented in future tense for research proposals
    - Presented in past tense for research reports
- A *research question* is the fundamental question inherent in the research topic.
- *Subquestions* are question subordinate to the research question. Their effect is complementary and cumulative; as the subquestions are answered, the main question is also ultimately answered.
- *Hypotheses* are succinct statements that forcast the findings of the study.
- A *research hypothesis* is a statement of what the investigator truly expects to find in the study.
    - *Directional hypothesis* indicate the direction of the results, positive or negative.
    - *Nondirectional hypothesis* does not specify direction of change, but only that change will occur.
    - *Null hypothesis* states that no effect will occur or that no differences or relationships will be found. Only six "differences between groups" out of 100 repetitions of the study are required in order to reject the null hypothesis. Researchers state hypotheses in the null form and then see if they can find contradictions to those hypotheses.
- A theory I san overall explanation of how things are, of of why things are as they are. It explains but does not predict. Hypothesis, on the other hand, do predict, and they can be drawn from theory.

Regulating the Size of a Research Paper

- Sizing is best approached by anticipating what must be done to investigate a problem… One follows a sequence of research steps. Assuming a topic has been selected and posed as a problem, the investigation will involve the following tasks:
    1. Reviewing the literature. You would hope to find 20 to 50 recent publications related, but not identical, to your topic. But if you find hundreds, the review of literature might become overwhelming. In that case you might narrow the topic further or do only a selected review of the literature.

2. Organizing the study. Some studies are easy to organize, whereas others are difficult because they involve many arrangements, selection procedures, permissions, approvals, and the like. Think through what will be necessary to enable you to complete the investigation.
3. Collecting and analyzing data. Collecting good data is usually the most difficult-at least the most worrisome and time-consuming. Data must be obtained in the appropriate kind and quantity, paralleling the investigation's research questions and hypotheses. Anticipating as precisely as possible the procedures involved in data collection will give you a good idea of whether a particular research topic can be investigated, given your constraints.

Forseeing the Research Report Format

- Research reports contain the following components:
    1. *Introduction*. This section specifies the topic and tells why it is worth investigating. In reports such as graduate theses the introduction may also contain a statement of the problem, hypotheses, research questions, definitions of terms, and limits placed on the study.
    2. *Review of related literature*. This component is not difficult to accomplish but may be very time-consuming, especially when there is a vast amount of literature related to your topic.
    3. *Method*. The method spells out how the study was designed and how data were obtained and analyzed. Listing the procedures followed is easy enough but actually carrying them out may involve an enormous amount of work. It is best to select a topic in which data can be obtained and analyzed easily. With the availability of computers and statistics programs, statistical treatments of the data no longer present a significant obstacle.
    4. *Findings*. Often called results, this section summarizes the new information that has been discovered. Findings are reported verbally, graphically, and/or numerically.
    5. *Conclusions and discussion*. Here the researcher clarifies the meaning of the new information discovered and uses that information to answer the research questions and to retain or reject the hypotheses. Also included are the investigator's speculations and other discussions about the study and conclusions reached.

The Value of Conventional Procedures and Reports

- From beginning to end, a prime goal should be to conduct and report research in a manner that quietly implies, "Here is my research; find fault with it if you can." This attitude explains why it is so necessary to select a topic of importance, refine it, follow established research conventions, and report the work clearly.

Preparing a Research Proposal

- An important task to accomplish before proceeding is to compose and submit a research proposal that includes:

    1. *Statement of the problem* – Explains the purpose of the study. This is usually a simple declarative statement that is kept short but identifies the key elements of the proposed study.
    2. *Significance of the problem* – A statement that explains why the problem merits investigation, including why it is worth the time, effort, and expense involved in carrying it out.
    3. *Research questions and/or hypotheses* – Posed to guide the study and lead to resolution of the central concern.
    4. *Definitions, assumptions, limitations, and delimitations* – Defines terms that are unclear or that have special meanings (insofar as such terms can be anticipated early in the study; modifications may be made later. The investigator also states any known assumptions that are being made but cannot be proved. Limitations are conditions outside the investigator's control that affect data collection. Delimitations are the boundaries purposely put on the study, usually to narrow it for researchability.
    5. *Survey of the literature* – For the research proposal, one need not conduct a full review of the literature. It is advisable, however, to survey the literature that is, to examine appropriate references and indexes in order to determine the amount and kind of literature that must later be reviewed. It is also important to scan titles of articles to see if any of them deal directly with the topic under consideration.
    6. *General procedures* – A preliminary listing of the steps to be undertaken in obtaining permission, selecting participants, composing questionnaires or selecting tests or similar materials, obtaining data, summarizing and analyzing data, and presenting findings and drawing conclusions. Of course, not all details of these steps, nor even all of the steps themselves, can be totally foreseen.
    7. *Time calendar* – A time line, with dates and deadlines, is superimposed, figuratively if not literally, on the list of procedures. Time is of the essence in most research, especially so for research in graduate degree programs, where an investigation often must be completed in as little as five or six months. A time calendar is therefore of great help in keeping one on track and on time.
    8. *Budget* – Often a good idea to prepare a budget that indicates direct and indirect costs. Direct costs are those that you will have to pay out of pocket for such things as tests, other materials, transportation, and clerical help. Indirect costs are those that someone (preferably not you) will have to pay for items such as utilities, space, computer access, custodial services, and the like.