LECTURE

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LECTURE

Module 4.2.

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The Introduction: Key Terms

Key Research Definitions and Research Typology basics

RESEARCH

- Broadly defined, the purpose of research is to answer questions and acquire new knowledge.
- Research is the primary tool used in virtually all areas of science to expand the frontiers of knowledge.
- For example, research is used in such diverse scientific fields as psychology, biology, medicine, physics, and botany, to name just a few of the areas in which research makes valuable contributions to what we know and how we think about things.
- Among other things, by conducting research, researchers attempt to reduce the complexity of problems, discover the relationship between seemingly unrelated events, and ultimately improve the way we live.

RESEARCH

- In all types of science, research is frequently used for describing a thing or event, discovering the relationship between phenomena, entailing making predictions about future events.
- In short, research can be used for the purposes of description, explanation, and prediction, all of which make important and valuable contributions to the expansion of what we know and how we live our lives.
- In addition to sharing similar broad goals, scientific research in virtually all fields of study shares certain defining characteristics, including

(1) testing hypotheses, (2) careful observation and measurement,

(3) systematic evaluation of data, and (4) drawing valid conclusions.

SCIENTIFIC RESEARCH

- In simple terms, *science* can be defined as a methodological and systematic approach to the acquisition of new knowledge. This definition of science highlights some of the key differences between how scientists and nonscientists go about acquiring new knowledge. Specifically, rather than relying on mere casual observations and an informal approach to learn about the world, scientists attempt to gain new knowledge **by making careful observations and using systematic, controlled, and methodical approaches.** By doing so, scientists are able to draw valid and reliable conclusions about what they are studying.
- In addition, scientific knowledge is not based on the opinions, feelings, or intuition of the scientist. Instead, scientific knowledge is based on **objective data** that were **reliably obtained** in the context of a carefully designed research study. In short, scientific knowledge is based on the accumulation of empirical evidence.

SCIENTIFIC RESEARCH METHODOLOGY

- Research methodology simply refers to the practical “how” of any given piece of research. More specifically, it’s about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives.
- For example, how did the researcher go about deciding:

❑ What data to collect (and what data to ignore)

❑ Who to collect it from (in research, this is called “sampling design”)

❑ How to collect it (this is called “data collection methods”)

❑ How to analyse it (this is called “data analysis methods”)

SCIENTIFIC RESEARCH METHODOLOGY

- Importantly, a good methodology chapter in a research paper or thesis explains not just **what** methodological choices were made, but also explains **why** they were made.
- In other words, the methodology chapter should **justify** the design choices, by showing that the chosen methods and techniques are the best fit for the research aims and objectives, and will provide valid and reliable results. A good research methodology provides scientifically sound findings, whereas a poor methodology doesn't.

SCIENTIFIC RESEARCH METHODS

- Qualitative, quantitative and mixed-methods are different types of methodologies, distinguished by whether they focus on words, numbers or both.
- **Qualitative research** refers to research which focuses on collecting and analysing words (written or spoken) and textual data, whereas quantitative research focuses on measurement and testing using numerical data.
- **Qualitative analysis** can also focus on other "softer" data points, such as body language or visual elements.

SCIENTIFIC RESEARCH METHODS

- Qualitative, quantitative and mixed-methods are different types of methodologies, distinguished by whether they focus on words, numbers or both.
- It's quite common for a **qualitative methodology** to be used when the research aims and objectives are **exploratory** in nature. For example, a qualitative methodology might be used to understand peoples' perceptions about an event that took place, or a candidate running for president.

SCIENTIFIC RESEARCH METHODS

- Qualitative, quantitative and mixed-methods are different types of methodologies, distinguished by whether they focus on words, numbers or both.
- **The mixed-method** methodology attempts to combine the best of both qualitative and quantitative methodologies **to integrate perspectives and create a rich picture**

SCIENTIFIC RESEARCH METHODS

- Qualitative, quantitative and mixed-methods are different types of methodologies, distinguished by whether they focus on words, numbers or both.
- Contrasted to this, **a quantitative methodol**ogy is typically used when the research aims and objectives are **confirmatory** in nature. For example, a quantitative methodology might be used to *measure the relationship between two variables* (e.g. personality type and likelihood to commit a crime) or *to test a set of hypotheses.*

SCIENTIFIC RESEARCH METHODS

Quantitative: distinct methods Inductive, apriori hypotheses, Positivism, Durkheim, functionalism, researcher separate from participants	Qualitative: fluid lines btw methods Deductive, no apriori hypotheses, Interpretivism, Weber, Symbolic Interactionism, researcher interacts with participants
Experiments: true, quasi quasi ['kweɪzaɪ], ['kwɑːzɪ]	Observation: participant, non-participant
Surveys: f-to-f, mail, phone	In-depth interviews: structured, unstructured
Cross-sectional vs. Longitudinal	Advanced Qualitative Methods
Longitudinal:	case study, extended case study
a. trend: follow 1 variable over time	Ethnography (critical observation of a culture)
b. cohort: follow a pop over time c. panel: follow same group over time	ethnomethodology: study small interactions (moments, situations), look for rules/methods of interaction
d. Time series	phenomenology: study experiences

	Qualitative Research	Quantitative Research
Purpose	Discover ideas/To gain a qualitative understanding of the underlying reasons and motivations	Test hypotheses or specific research questions/To quantify the data and generalize the results from the sample to the population of interest
Approach	Observe and interpret	Measure and test
Data Collection Methods	Unstructured; free- forms	Structured; response categories provided
Researcher Independence	Researcher is intimately involved; results are subjective	Researcher is uninvolved; results are objective
Sample	Small samples – often natural setting	Large samples to allow generalization
Most often used in:	Exploratory research designs	Descriptive and causal research designs
Outcome	Develop an initial understanding	Recommend a final course of action

SOME SCIENTIFIC RESEARCH METHODS

Questionnaires

Questionnaires are a good way to obtain information from a large number of people and/or people who may not have the time to attend an interview or take part in experiments. They enable people to take their time, think about it and come back to the questionnaire later. Participants can state their views or feelings privately without worrying about the possible reaction of the researcher. Unfortunately, some people may still be inclined to try to give socially acceptable answers. People should be encouraged to answer the questions as honestly as possible so as to avoid the researchers drawing false conclusions from their study.

SOME SCIENTIFIC RESEARCH METHODS

Case studies

Case studies usually involve the detailed study of a particular case (a person or small group). Various methods of data collection and analysis are used but this typically includes observation and interviews and may involve consulting other people and personal or public records. The researchers may be interested in a particular phenomenon (e.g. coping with a diagnosis or a move into residential care) and select one or more individuals in the respective situation on whom to base their case study/studies. Case studies have a very narrow focus which results in detailed descriptive data which is unique to the case(s) studied. Nevertheless, it can be useful in clinical settings and may even challenge existing theories and practices in other domains.

SOME SCIENTIFIC RESEARCH METHODS

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VALIDITY

Four Types of Validity

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- **Internal validity** refers to the ability of a research design to rule out or make implausible alternative explanations of the results, or plausible rival hypotheses.
- **External validity** refers to the generalizability of the results of a research study.
- **Construct validity** refers to the basis of the causal relationship and is concerned with the congruence between the study's results and the theoretical underpinnings guiding the research.
- **Statistical validity** refers to aspects of quantitative evaluation that affect the accuracy of the conclusions drawn from the results of a study.

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(A *plausible rival hypothesis* is an alternative interpretation of the researcher's hypothesis about the interaction of the dependent and independent variables that provides a reasonable explanation of the findings other than the researcher's original hypothesis.)

Four Types of Validity

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- **External validity** refers to the generalizability of the results of a research study. In all forms of research design, the results and conclusions of the study are limited to the participants and conditions as defined by the contours of the research. External validity refers to the degree to which research results generalize to other conditions, participants, times, and places.

Four Types of Validity

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- **Construct validity** refers to the basis of the causal relationship and is concerned with the congruence between the study's results and the theoretical underpinnings guiding the research. In essence, construct validity asks the question of whether the theory supported by the findings provides the best available explanation of the results.

Four Types of Validity

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- **Statistical validity** refers to aspects of quantitative evaluation that affect the accuracy of the conclusions drawn from the results of a study. At its simplest level, statistical validity addresses the question of whether the statistical conclusions drawn from the results of a study are reasonable.

Selection Biases

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Selection biases are common in quasi-experimental designs and can interact with other threats to internal validity, such as maturation, history, or instrumentation, to produce effects that might not be attributable to the independent variable.

Threats to Statistical Validity

- **Low statistical power:** Low probability of detecting a difference between experimental and control conditions even if a difference truly exists.
- **Procedural and participant variability:** Variability in methodological procedures and a host of participant characteristics, which decreases the likelihood of detecting a difference between the control and experimental conditions.
- **Unreliability of measures:** Whether the measures used in a study assess the characteristics of interest in a consistent manner. Unreliable measures introduce more random variability into the research design,
which reduces statistical power.
- **Multiple comparisons and error rates:** The concept that, as the number of statistical analyses increases, so does the likelihood of finding a significant difference between the experimental and control conditions
purely by chance.

Randomization

Randomization

Randomization is a control method that helps to eliminate alternative rival hypotheses that might otherwise explain the results of the study.
Randomization does not attempt to eliminate sources of artifact and bias from the study.
Instead, it attempts to control for the effects of extraneous variables by ensuring that they are equivalent across all of the experimental and control groups in the study.

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