

COMP 7036

Applied Research Methods in Software Development

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Examining studies and articles

Overview

- Categories of research
- Planning vs methodology
- General criteria
- Design of studies
- Reviewing articles

Categories of research

- **People**

- children, adults, families, communities, cultural groups, employees, etc.

- **Things**

- animal/vegetable life, viruses/bacteria, inanimate objects, matter, stars, galaxies, etc.

- **Records**

- newspapers, journals, letters, minutes, legal documents, census reports, etc.

Categories of research

- **Thoughts & Ideas**

- concepts, theories, perceptions, opinions, beliefs, issues, etc.

- **Dynamics & Energy**

- human interactions, metabolism, quantum mechanics, wave mechanics, etc.

Planning vs Methodology

- **Research Planning**

- general approach to planning research study
- may be similar across disciplines

- **Research Methodology**

- techniques to collect/analyze data
- may be specific to particular academic discipline

General criteria

- **Universality**

- project should be one that might be carried out by any competent person
- researcher = catalyst who collects, organizes, and reports what collected data seem to indicate

- **Replication**

- research should be *repeatable*
- any other competent person should be able to take the problem and, collecting data under same circumstances and within same parameters, achieve comparable results

General criteria

- **Control**

- researcher must isolate, or *control*, factors that are central to research problem
- control important for replication/consistency within research design

- **Measurement**

- data should be able to be measured in some way

Study design

- Correlational research
 - Examines extent to which differences in one variable/characteristic related to differences in one or more other ones
 - Researchers gather data about 2+ characteristics for particular group to determine any interrelationships
 - Correlational data plotted on scatter plot
 - Correlation \neq causation!

Study design

Cross-sectional study

- People from different age groups sampled and compared

Longitudinal study

- Single group of people followed over time, and data related to characteristics under investigation collected at various times

Study design

Cross-sectional:

- easier to conduct because all data can be collected at one time
- different age groups may represent different life experiences: threat to internal validity
- correlations between characteristics at different age levels cannot be computed

Longitudinal:

- data collected over period of months or years
- participants may drop out
- people can get used to measurement instrument, and thus affect their response

Study design

Cohort-Sequential:

- Addresses some weaknesses of longitudinal and cross-sectional designs
- Researcher begins with 2+ groups (like cross-sectional) and follows each group over period of time (like longitudinal piece)
- Allows calculation of correlations between measures taken at 2 different times: predictions can be made across time

Reviewing articles

- What is the merit?
- Is it presented well?
- Does it have a logical structure?
 - Abstract
 - Introduction
 - Body (technique, results, discussion)
 - Conclusions
 - References
 - Tables and figures (with captions)

Reviewing articles

- Abstract
 - Summarizes the paper
 - Includes conclusions as well as statement of original problem
- Introduction
 - Explains why the topic is important
 - Reviews other work

Reviewing articles

- Body
 - Approach and analysis
 - Results: basis for claims
 - Errors and uncertainties
 - “Right” level of detail
- Conclusions
 - Summarizes – no surprises or new information
 - Points to future work (separate section?)

Reviewing articles

- References
 - Other work
 - Especially important for more recent work
- Tables and figures
 - Conveys information and findings visually
 - Describes design and concepts

Summary

- Categories of research
- Planning vs methodology
- General criteria
- Design of studies
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