

Instructional design research:  
development of framework for X, product or  
instrument design or, the impact of X

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# Why research in this?

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- # Identify a need or problem or there's problem to be solved
- # Review past studies
- # Justifications
  - No, new, rare studies
  - No product, module
  - No framework for the product design
  - No empirical test the product: usability vs impact

# Quantitative and Qualitative

Big names in research methodology

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# Emile Durkheim

# Lee Cronbach

# L Guttman

# Gene Gass

# Creswell

# Patton

# Merriam

Education

Sociology

Language

Mobile

Human resource

Science

Mathematics



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# Classification of Research by Purposes and Methods



# Research by Purposes

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- # **Basic/Fundamental/Theoretical:** refine/develop theory, framework, instrument
- # **Applied research:** apply and test a given theory and its evaluation in solving educational problems
- # **Evaluation research:** facilitate decision making
- # **R & D:** develop effective products
- # **Action research:** solve problems

# Dichotomy vs hybrid

## Fundamental

theoretical

framework  
design

product  
design

## Application

phenomenon

impact

intervention

Qualitative & Quantitative

Factors: needs, principles, usability

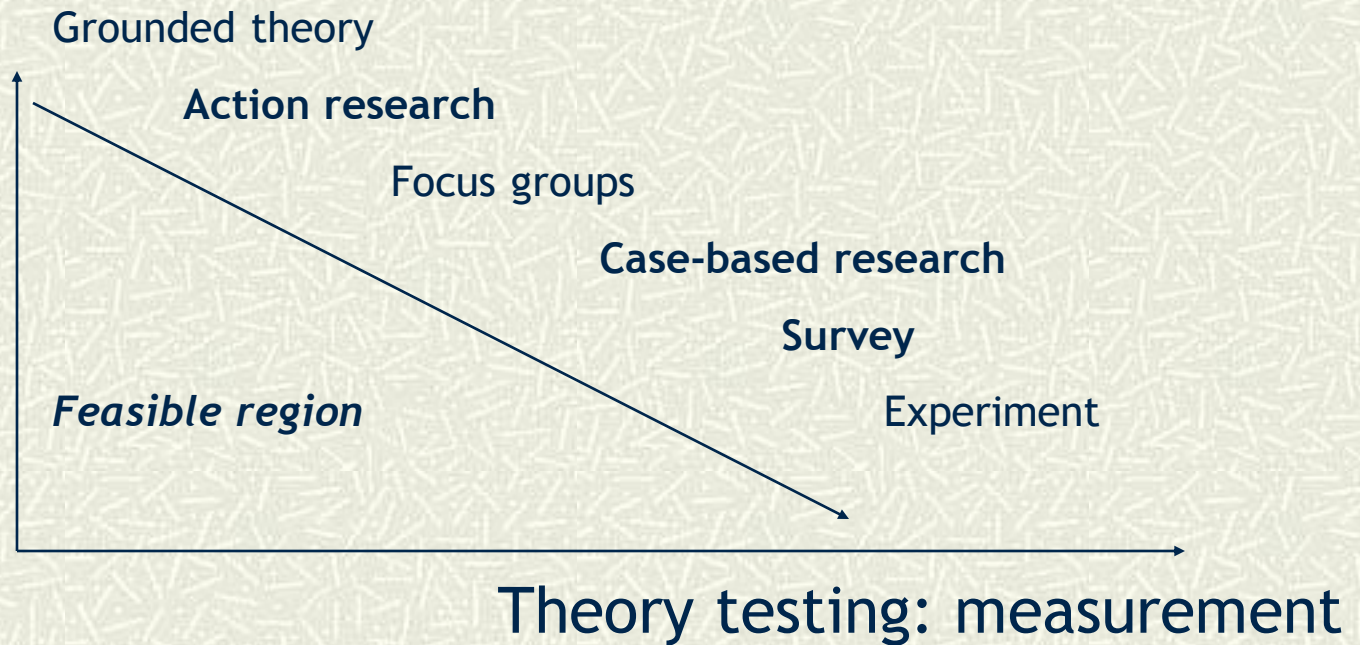
Factors: time, culture, habits

Theory building: meaning

Theory testing: measurement

# Research: theory.....

Theory  
building:  
meaning



# Research by Methods

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- # Historical research
- # Policy research
- # Product design research
- # Descriptive research
- # Correlation research
- # Causal-comparative and Experimental

Knapper and Cropley (1991)



# Historical research

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- # Involves studying, understanding, and **explaining past events**
- # To arrive at conclusion concerning causes, effects, or trends of past occurrences that may help to explain current events and **anticipate future events**
- # **Data collection:** primary (oral - interview; observation) and secondary (documents, artifacts)
- # **Criticism:** authenticity of data, worthy

# Descriptive research

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- # Involves collecting data to **test hypotheses or answer questions** concerning the current status of the subject of the study
- # **Data collection:** survey, interview, observation
- # Develop **instruments** for specific studies
- # **Criticism:** lack of response, failure of respondents to return questionnaires or attend interviews

# Product design research

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- # Involving needs analysis: literature, stakeholders (admin, teachers), target users,
- # Designing alpha version and beta version of the product
- # Testing the product: usability, technicalities
- # **Data collection:** primary
- # **Criticism:** time consuming



# Correlation research

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- # Involves examining if there is a **relationship** or to use it to **predict and anticipate future events**
- # To determine whether, and to what degree, **a relationship exists** between two or more quantified variables
- # **Data collection:** primary and secondary
- # **Criticism:** Highly correlated relationship does not mean there is cause and effect but the existence permits prediction



# Causal-Comparative and Experimental Research

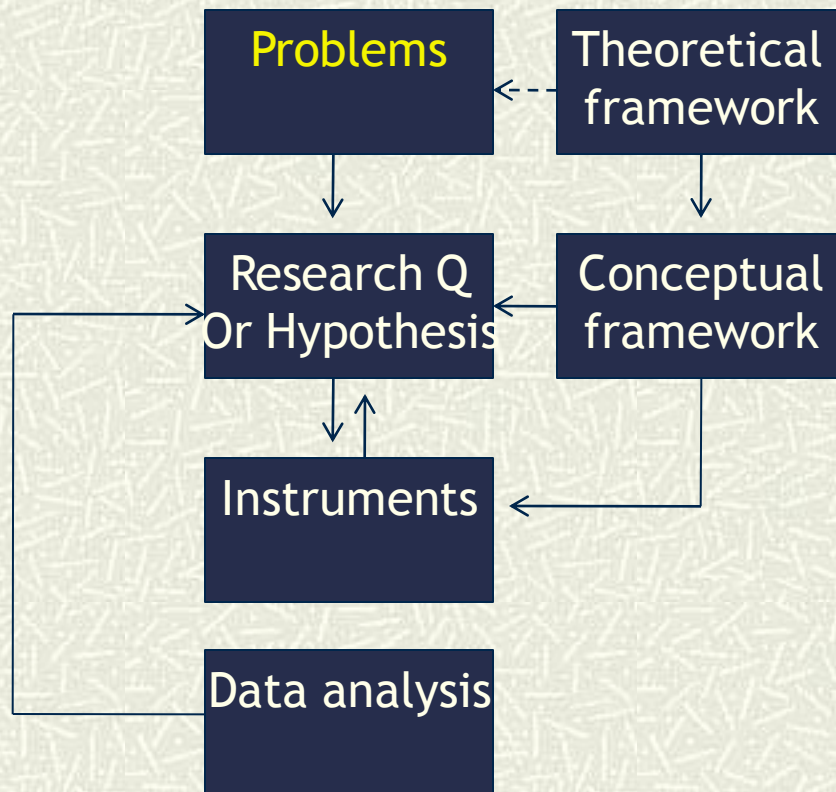
- # Involves manipulation - to determine the **cause** (treatment - independent variable) **and effect** (outcome -dependent variable)
- # **One group:** treated overtime; pre-test and post-test
- # control and experimental - treated; pre-test **Two groups:** and post-test
- # **Criticisms:**
  - In causal-comparative research, the difference between the groups **could not** be determined by researcher
  - In experimental research, the cause-effect relationship **can** be determined by researcher



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# Research planning

# Overview of Research Process





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# Theoretical Framework and Conceptual Framework



# Theoretical Framework

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## # Theories

- Education
- Psychology
- Language
- Politics
- Engineering

## # Models

# Conceptual Framework

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- # CF **guides** a research to carry out the research within **certain parameters**
- # It focuses on **specific elements or components, concepts, or constructs** of theory(ies)/model(s)
- # It is represented in a **visual form** (diagram) that shows the relationship among the components

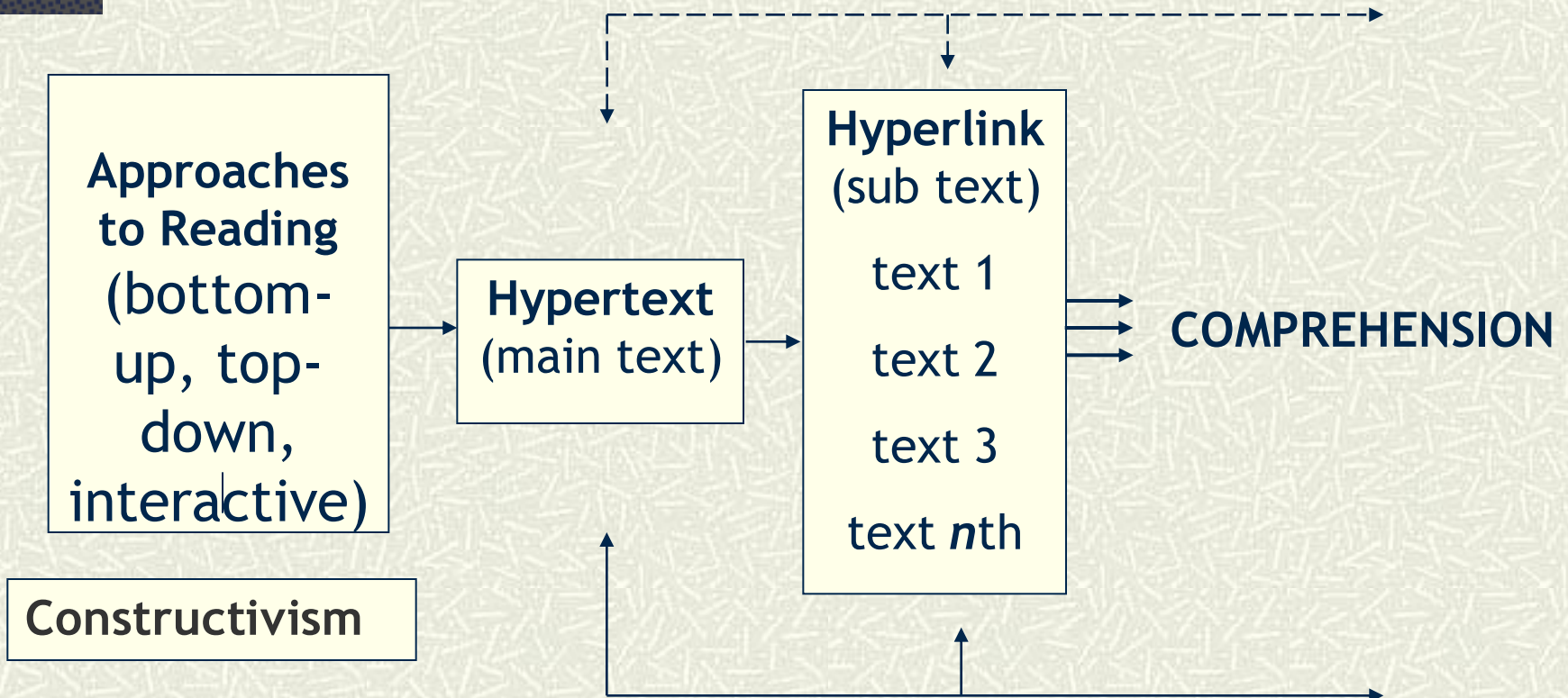
# e.g., Theoretical Framework

## # Theoretical Framework



## # Past Studies

# e.g., Conceptual Framework







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# Literature review

# Review of Literature

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## # Why?

- Review what other people have done or are doing and what have not been done
- Avoid “reinventing the wheels”
- Relate to your research

## # What?

- Primary sources, secondary sources

## # Where?

- Library, internet, personal collections, institutions

## # How much to be done?

- 5-10 years literature review

# Source of references

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## # Credible

- Journals, books, reports, proceedings, thesis
- Papers presented at conferences
- Dissertations, Ph.D., M.A.

## # Less credible

- Magazines, newsletter, newspapers

# How to find references?

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## # Internet

- Online journals, proceedings
- Online papers

## # Journals

- Specific discipline - journals
- Local
- Abroad



# Lit. review processes

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- # **Selecting**- “pick and choose” the literature; well-known, leading figures
- # **Analyzing**- what is the best for your research reference
- # **Synthesizing** - extract and put things together
- # **Re-conceptualizing** - come out with conclusions, framework, plan, review research topic and interest, and narrow your focus

- # Study the “lit. review, past studies” within the journal articles
- # Examine the theoretical framework used in the studies
- # Look for instruments used, if any
- # Notice how data were collected and analyzed
- # Record the findings reported in the articles
- # Keep all references (accuracy)

# Research questions

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- # What?
- # How?
- # Why?
- # To what extent / degree?



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# Research Design



# Dichotomy vs hybrid

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Factors: needs, principles, usability

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# Hawthorne effect

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- # The **Hawthorne effect** is a form of reactivity whereby subjects improve or modify an aspect of their behavior being experimentally measured simply in response to the fact that they know they are being studied, not in response to any particular experimental manipulation.

# Snowball effect

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- # **Snowball effect** is a figurative term for a process that starts from an initial state of small significance and builds upon itself, becoming larger (graver, more serious), and also perhaps potentially dangerous or disastrous (a vicious circle, a "spiral of decline"), though it might be beneficial instead (a virtuous circle). This is a very common cliché in cartoons and modern theatrics and it is also used in Psychology.



# Sample population

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## ■ How to select?

- Random: independent, equal chance of being selected
- Purposive sampling, convenient sampling
- Stratified: identified subgroups in the population
- Cluster: randomly selected groups, not individuals
- Systematic: Individuals selected -  $K$ th name from a list divided by the number of subjects desired for the sample (random)

## ■ Size

- The larger sample, the less variation, the more accurate, the more representative
- Minimum number: Descriptive 10% Correlation 30 subjects, causal-comparative 30 subjects per group; experimental 15 subjects
- 30% of the population

## ■ Sampling bias

- Volunteers and available groups
- Administrative reason



# Data collection

## # How?

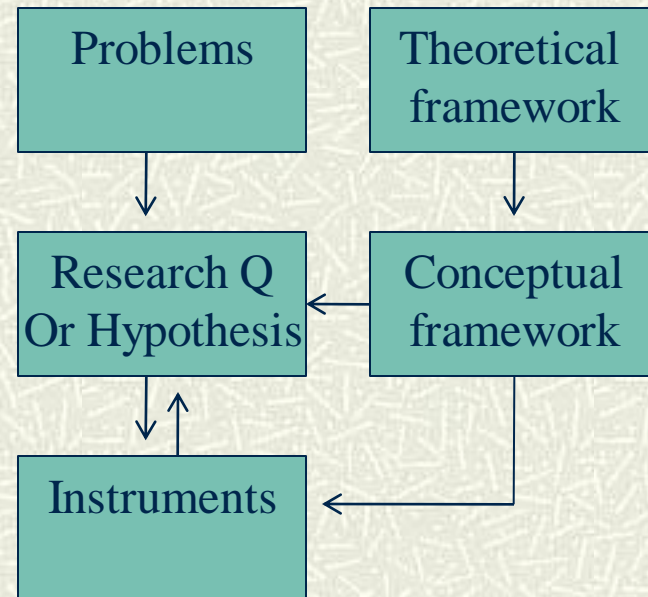
- Survey; questionnaire
- Observation
- Interview

## # What?

- Instruments
- Checklist
- Recorders, Cameras

## # When?

- Pre- post-
- Repeated measure



# Instruments

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- # Survey question
- # Adopt what is available
  - Tested, validated
- # Adapt
  - Needs to test for reliability and validity
- # Construct a new one based on specific needs
  - Validity: content, construct, concurrent, predictive
  - Reliability: test-retest, equivalent-forms, split-half, rationale equivalence, scorer/rater

# Construction of questionnaire

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- # Must refer to **research questions**
  - Demographic
  - What, why, how, to what extent
- # Structured
  - Objective: yes-no, male-female, education
  - Likert scale: 1-5, degree of agreement
- # Unstructured
  - Open ended
- # Formulation
  - + - values
  - Randomization

# Interview questions

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- # Must refer to research questions
  - Demographic
  - What, why, how, to what extent
- # Look for details, insights, hidden reasons
- # Recording procedure
- # Infer responses
- # Categorize responses
- # Quantify responses
- # Quote responses



# Type of observations

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- # Non-participant observation
  - Not directly observed; “distance”
- # Participant observation
  - Be with the subjects in the situation to be observed; recording; observation checklist
- # Case study
  - Thorough analysis, periodic observation
- # Ethnography
  - live with the population; recording



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# Data analysis

# Data Analysis

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## # Quantitative

- Numbers
- Coding
- Analysis: statistics - frequency, cross-tab, t-test, ANOVA, correlation, multivariate, regression

## # Qualitative

- Statements
- Description of behaviors

## # Both qualitative and quantitative

# Data analysis

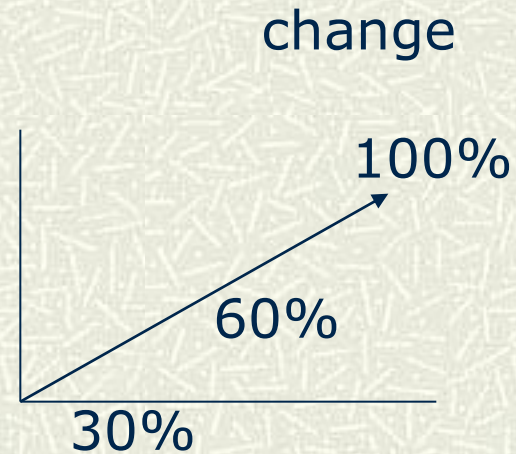
Experimental, descriptive, behavior patterns

Quantitative data



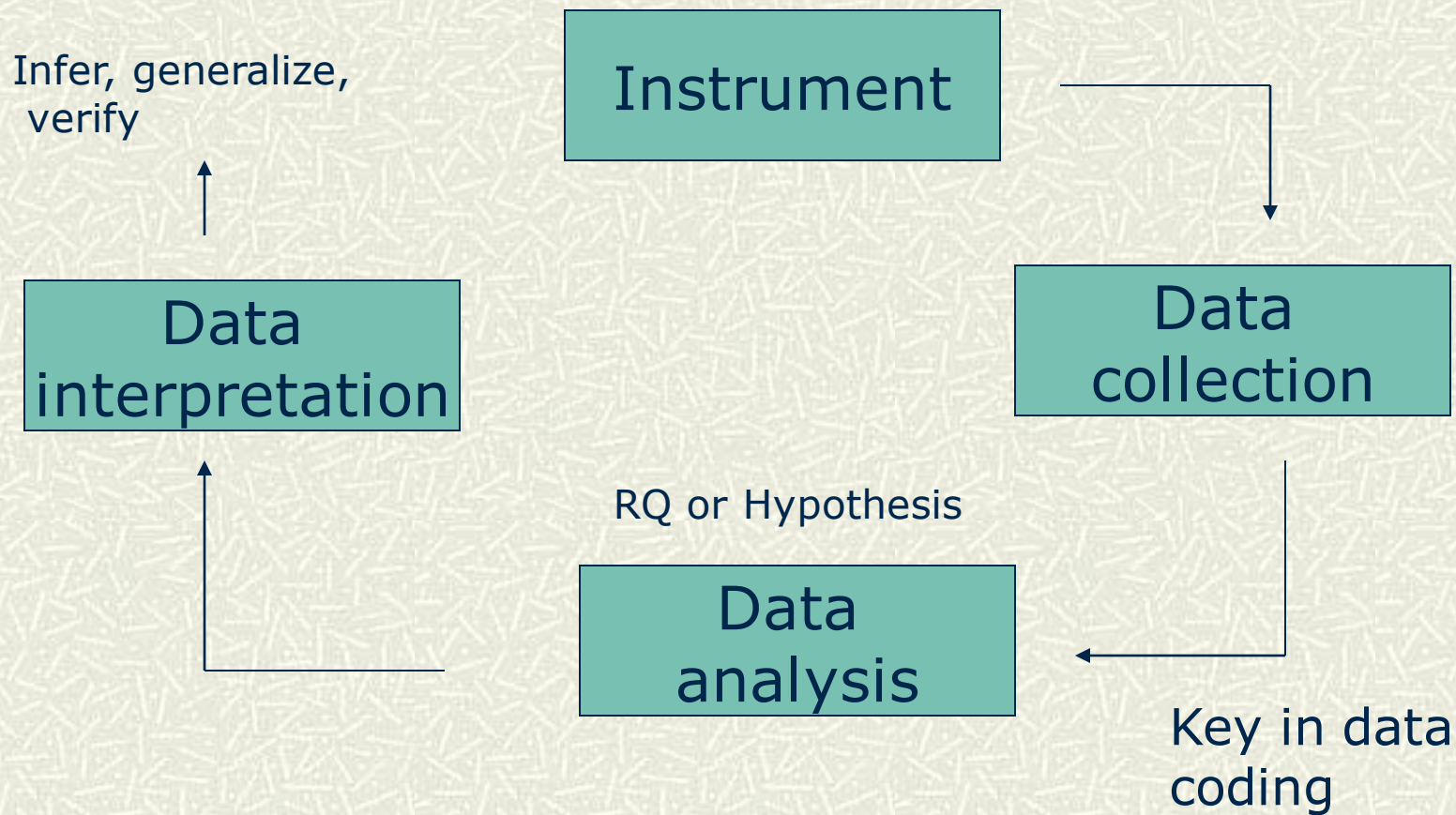
Qualitative data

Historical, case study, ethnographic, policy





# Sequence

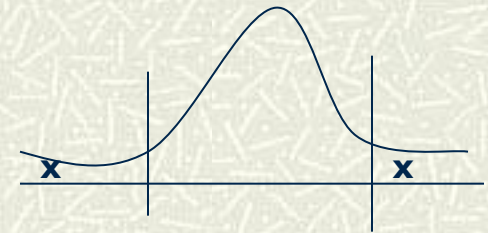


# Tests of significance

# Purpose: whether to reject null hypothesis or not

# Types

- T-test
- ANOVA (analysis of variance)
- Multiple comparisons
- Factorial analysis of variance
- ANCOVA (analysis of covariance)
- Chi Square
- Pearson  $r$



# Procedures

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- # Distribute instrument
- # Collect responses
- # Key in data
- # Run statistical analysis (+several)
- # Create graphs
- # Print output
- # Interpret output
- # Inferences
- # Generalization
- # Verification/Post-test (para & non-parametric)



Thank you

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