

2700P12030

TEL 598

Research Methods

Triangulation in Research

What - Triangulation is the application and combination of several research methodologies in the study of the same phenomenon.

- It can be employed in both quantitative(validation) and qualitative(inquiry) studies.
- It is a method-appropriate strategy of founding the credibility of qualitative analyses.
- It becomes an alternative to " traditional criteria like reliability and validity"
- It is the preferred line in the social sciences

Why - By combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single method, single-observer, single-theory studies.

Types of Triangulation:

There are four basic type of triangulation:

- a. data triangulation, involving time, space, and persons
- b. investigator triangulation, which consist of the use of multiple, rather than single observers;
- c. theory triangulation, which consists of using more than one theoretical scheme in the interpretation of the phenomenon;
- d. methodological triangulation, which involves using more than one method and may consist of within-method or between-method strategies.
- e. * multiple triangulation, when the researcher combines in one investigation multiple

observers, theoretical perspectives, sources of data, and methodologies.

An example of Multiple triangulation: The Police Peasant in Europe and America by Thomas and Znanieck's. Their investigation uses triangulated data, investigators, theories, and methods.

Criticisms of Triangulation usually to its data triangulation, investigator, theory, methods

Case Study Research: Design and methods

Yin, R.K. (1984). Case Study Research: Design and methods. Thousands Oaks

(CA, USA): Sage(Chapter. 1, 2)

What - deal with case study strategy : design, analysis, and reporting issues

Why - to help investigators deal with some of more difficult questions;

- a. how to define the case being studied
- b. how to determine the relevant data to be collected
- c. what should be done with data

Rationale : case study as a research tool → design and analysis

Comparing case studies to other research strategies

Strategies - experiment, survey, history, case study, archival analysis

A pluralistic is different strategies view

All strategy can used for all three purposes : - exploratory, descriptive, explanation

When and Why you want to do case studies?

When to use each strategy?

It depends on : a) Form of research question

- b) requires control over behavioral events
- c) the degree of focus on contemporary events

a)Type of Research Question:

- What : exploratory, a form of how many/how much : surveys, archival analysis
- Who and Where : predictive about outcomes: surveys, archival analysis
- How and Why : explanatory : case studies/history/experiment

RQ rationale: to differentiate among the various of research strategies is to identify the type of research question.

RQ should have :

- substance(what is my study about) and
 - form of question 4W and 1 H

b) extents of control over behavioral events

case study uses How and Why of RQ , and uses two sources of evidence : direct

observation, systematic interviews, documents, artifacts

The concerns of case study:

- a. lack of rigor :
- b. CS provide very little basis for scientific organization(How can you generalize?)

CS like an experiments, are generalizable to theoretical propositions not to population

- c. CS take too long time and result massive, unreadable documents

Definition of the case study as a research strategy:

A case study is an empirical inquiry that:

- investigate a contemporary phenomenon within its real-life context; when
- the boundaries between phenomenon within its real-life context; when in which
- multiple sources of evidence are used

Variations in case studies as a research strategy

- CS includes both style and multiple-case studies
- CS can include, and even be limited to quantitative evidence
- CS studies have a distinctive a place in evaluation

Chapter 2. Design Single and multiple case studies

A research design is the logic that links the data to be collected and the conclusions to be drawn to the initial questions of a study. Every empirical study has an implicit, if not explicit research design.

For case studies, four major type of designs are relevant(see figure 1.)

The case study investigator also must maximize four aspects of the quality of any design:

- construct validity: establishing correct operational measures for the concept being studied;
- internal validity(for explanatory or causal case studies only), and not for descriptive or exploratory studies): establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationship
- external validity

establishing the domain to which a study's findings can be generalized; and

- reliability: demonstrating that the operations of a study- such as the data collection procedures- can be repeated, with the same results

Four tests may be considered relevant in judging the quality of a research design.

In designing and doing case studies, various tactics are available to deal with these tests. Some of the tactics occur during the data collection, data analysis, or compositional phases of the research.

Four case study strategy, the four types of design are:

1. single-case(holistic) designs
2. single-case(embedded) designs
3. multiple-case(holistic) designs
4. multiple-case(embedded)design

Developing Realistic Mathematics Education

Gravemeijer, K.P.E.(1994). Developing Realistic Mathematics Education. Utrecht. CD B. Press.

What?

Curriculum development and educational research on realistic mathematics in the Netherlands is embedded in a holistic framework defined as educational development.

What is realistic mathematics education?: mathematics education that is compatible with the idea of mathematics as a human activity.

Educational Development- Curriculum development 'plus' the end goal of changing educational practice(pre/in service teacher training, counseling, test development, and opinion shaping are incorporated in the development work.

Idea adapting, improving, and adjusting continuously is characteristics of educational development.

Curriculum development: may encompass research elements. In this dissertation , it implies that the instructional activities should capitalize on mathematizing as the main learning principle. Mathematizing enables students to reinvent mathematics.

Development research relies on developing prototypes of instructional sequence.

It is not established as a research discipline, that is why *its characteristics* should be explicated and its *methodological aspects*(use qualitative research treated with reliability, objectivity, validity-internal/external and objectivity) should be discussed.

Freudenthal 's development research concept is a cyclic process that starting from:

- **self-evident thought experiments, developer will envision how teaching-learning processes will be proceed(*invent it*),**
- **find evidence in a teaching experiment whether the expectations were right or wrong (*practice it*)**
- **use feedback of practical experience in to new thought experiments induces an iteration of development and research(*analyze it and use it for next development and research*)**

Different between curriculum development(CD) and development research(DR) is

CD: focus on the instructional activities that embody the educational change; the emphasis on the product, not on the learning process of the developer(knowledge gained will remained implicit, tacit knowledge)

- bricolage concept(is a handyman who invents pragmatic solution that can differ greatly from what a professional would be chosen) illuminates the idea of using what is available and adapting those means to one's momentary goals is important.

DR: knowledge gain is the main concern on building theory and evolutionary aspects is more important

Conclusion:

DR, theory-guided bricolage, teacher adoption as a learning process, and evaluation as outlined here, combined with the umbrella of educational development, offer an comprehensive alternative for the RDD-model.

Third Reflection

By Zulkardi

Yin(1984) mentions that case study as a research tool in terms of design and analysis together with others research strategies(experiment, survey, history, and archival analysis) can used for all three purposes : exploratory, descriptive, explanation. When to use each strategy? It depends on form of research question, requires control over behavioral events, the degree of focus on contemporary events. Type of Research Question can be in the form of :

- What : exploratory, a form of how many/how much : surveys, archival analysis
- Who and Where : predictive about outcomes: surveys, archival analysis
- How and Why : explanatory : case studies/history/experiment

Three main activities in case studies is: design, analysis, and reporting issues. The problems often arise in the form of question when investigators do a case study are: how to define the case being studied, how to determine the relevant data to be collected, and what should be done with it

A research design of a case study is the logic that links the data to be collected and the conclusions to be drawn to the initial questions of a study. The case study investigator also must maximize four aspects of the quality of any design: construct validity, internal validity, external validity, and reliability.

There are some concerns about case studies: lack of rigor, provide very little basis for scientific organization(How can you generalize?), like an experiments are generalizable to theoretical propositions not to population, take too long time and result massive, and unreadable documents But there are a way to cover those concern such as using triangulation method(Denzin, 1992).

Triangulation is the application and combination of several research methodologies in the study of the same phenomenon. It can be employed in both quantitative(validation) and qualitative (inquiry) studies. Triangulation method is preferred line in the social sciences due to its strengthens to combining multiple observers, theories, methods, and empirical materials in which Sociologists hope to overcome the

weakness or intrinsic biases and the problems that come from single method, single-observer, single-theory studies.

Qualitative Data Qualitative data usually in the form of words rather than numbers. Its data in the forms of *words* that gathered by *observation, interviews, or documents*. Those data require some *processing*. Raw fields notes need to be corrected; tape recordings need to be transcribed and corrected. The best strategy for discovery, developing hypotheses, testing hypotheses, and useful when one needs to supplement, validate, explain, illuminate, or reinterpret quantitative data gather from same setting Qualitative Analysis consist of three concurrent flows of activity: data reduction, data display, and conclusion drawing/verification. Figure Component of data Analysis :Interactive Model below(adapt from Miles et al., 19..)



New methods for qualitative data collection & analysis: Vignettes and Pre-structured cases.

Vignettes is essentially snapshot or mini movies of professional practice that contain thoughtful explanations and reflective. They combine a systematic, structured approach with the expression of personal meaning(emic). It is not time consuming but easily to be biased and self serving.

Vignettes can be used as: as a representation of a formal program evaluation, as a mini cases for in-service training , as a potential research tool to describe a case study, and problem solving and policy planning. Another method is **pre-structured case methods**. It is useful when time is short, enables predictable budgeting and planning, it reduce analysis anxiety and increases confidence in findings, the research question should be well-defined not exploratory

Curriculum development and educational research on realistic mathematics in the Netherlands is embedded in a holistic framework defined as educational development. Realistic mathematics education is mathematics education that is compatible with the idea of mathematics as a human activity. It implies that the instructional activities should capitalize on mathematizing as the main learning principle. Mathematizing enables students to reinvent mathematics.

In this dissertation(Gravemeijer, 1994) **development research** relies on developing prototypes of instructional sequence. It is not established as a research discipline, that is why *its characteristics* should be explicated and its *methodological aspects(use qualitative research treated with reliability, objectivity, validity-internal/external and objectivity)* should be discussed.

Freudenthal 's development research concept is a cyclic process that starting from:

self-evident thought experiments, developer will envision how teaching-learning processes will be proceed(*invent it*), find evidence in a teaching experiment whether the expectations were right or wrong (*practice it*), use feedback of practical experience in to new thought experiments induces an iteration of development and research(*analyze it and use it for next development and research*). This approach also uses bricolage concept(is a handyman who invents pragmatic solution that can differ greatly from what a professional would be chosen) iluminates the idea of using what is available and adapting those means to one's momentary goals is important.

Formative Evaluation(Tessmer, 19) is gathering data process to determine the value of the product/instruction, of its strengths and weakness in order to improve or develop the product/instruction. It is a systematic and empirical method for revising instruction to improve its effectiveness and efficiency and efficiency. It is the 'quality control' step to improve 'the product' and is used in a development stage of a "prototyping project".

Type of Formative Evaluation: expert review, one-to-one evaluation, small group, field test. Between each type the product is revised. There are variations that can be used: self evaluation, expert panels, two-on-one evaluation, and rapid prototyping.

How conduct the Formative Evaluation? Identifying problems and weakness(plan the evaluation), introduce the evaluation to participants, conduct the evaluation, gather and organize data, make data-based revision on evaluation data, and evaluated revised version(to confirm the success of revisions and identify any further weakness. Problem? It is found usually on selecting subjects for the evaluation and deciding what and how to revise the instruction. Solution use priority to choose which one is the best.