



# Design Tools for Facilitating Qualitative Research Design in the Information Systems Environment

Jakovljevic Maria, School of Economics & Business Sciences, Information Systems, University of the Witwatersand, Private Bag 3, Wits 2050, South Africa, T 27-11-717-8161, F 27-11-717-8139, [jakovm@sebs.wits.ac.za](mailto:jakovm@sebs.wits.ac.za)

## ABSTRACT

Instructors in the information systems environment respond to complex information systems design tasks ignoring the need for creating design tools in order to develop understanding of qualitative research design and skills in writing qualitative research proposals. There is little in the research literature on using graphical tools such as concept maps that will engage students in the development of qualitative research skills.

The aim of this paper is to explore appropriate design tools in aiding the facilitation of qualitative research design and writing research proposals in the context of Information Systems.

This research was based on a qualitative approach where observations and document sources were used to gather data. Twelve students at an institution of higher education were observed and their experiences were investigated through their document sources.

A variety of design tools for instruction are offered: concept maps, support tools, inference maps and design templates. These need to be integrated in facilitating qualitative research design and writing research proposals to counter for the complexity of its structure.

## INTRODUCTION

Very little has so far been evident in literature on the identification of design tools, which can contribute to a meaningful understanding of qualitative research procedures and writing qualitative research proposals. An examination of literature suggests that design tools have not been much of an issue.

Though numerous research reports have provided a body of information about a wide range of techniques in qualitative research design (Merriam, 1998, Yin, 1994, Creswell, 1994) far less research has been conducted on those aspects of teaching on how to write qualitative research proposals.

The tasks of Information Systems (IS) postgraduates require specific writing skills that students need to develop in writing research reports. The experience of the researcher in this study confirms that, the students in the IS environment, lack the skills in writing a qualitative research proposal. Instructors in the information systems environment declare that students have difficulty in choosing a research topic with the focus on the qualitative research design.

There are a number of research findings that highlight the need for graphical means such as concept mapping (James & Gardner, 1995; Jonassen, Beissner & Yacci, 1993; Jonassen, 1996; Le Lean, 2003) and logical tools such as inference trees and trees (Mende, 2005), in order to create a meaningful learning environment.

Concept maps are special representations of ideas and their interrelationships within the human memory structure (Jonassen, 1996; Leaub, & Brasilia, 1998). The purpose of the inference tree is to visually depict argument construction (Mende, 2005).

It is, however, it is not clear how concept mapping and trees could be integrated through current instructional strategies in facilitating qualitative research design within the Information Systems environment.

Based on the practical experience and research findings it is assumed that the identification of appropriate tools to teach qualitative research design and writing research proposals will deeply engage learners in research activities.

The research question addressed in this paper is:

*What design tools can contribute to enhancing the understanding of qualitative research design and writing of qualitative research proposals, within an Information Systems environment?*

The purpose of this paper is to investigate design tools which might aid the understanding of qualitative research procedures and enhance writing qualitative research reports. To accomplish this task, it is necessary to introduce different design (graphical) tools: concept maps, design templates, checklists and logical tools.

## THE FRAMEWORK FOR FACILITATING QUALITATIVE RESEARCH DESIGN

Most authors (for example, Merriam, 1998; Henning, Gravett & van Rensburg, 2002) have no common interpretation relating to teaching qualitative research design particularly facilitating writing qualitative research reports.

Qualitative research requires a mature researcher with a in-depth self-insight in analysing the problem of the study (Huysamen, 1994). Dealing with qualitative research design needs extensive experience and competency of the researcher (Huysamen, 1994). Students who pursue qualitative research are usually not experienced and they lack skills in writing qualitative research proposals.

### Current Instructional Strategies in Facilitating Qualitative Research Design

The facilitation of qualitative research design demands an active involvement from students. Thus, learners must know how to organise, synthesise, and manipulate information constructively. Appropriate guidelines are necessary in developing a meaningful learning atmosphere.

The constructivist approach focuses on knowledge construction and the development of reflective awareness of learning processes. Constructivists emphasise that students need to be actively involved, to reflect on learning and to make inferences (McCormick, 1997:141; Winn, 1990:53). Some researchers (for example, Johnson, 1997) highlight cognitive apprenticeship, an interaction between expert and novice aimed at enhancing the cognitive and metacognitive skills of students.

## Identifying Appropriate Design Tools and Techniques for Facilitating Qualitative Research Design

### Concept Mapping

Research findings support the use of concept mapping in any learning context (Kommers, 1989; Kozma, 1987). Learners inter-relate the ideas in a content domain, label and describe the relationships among ideas, which improves their understanding and critical thinking (Jonassen, 1996:93). Learners have the opportunity to practice structural knowledge through concept mapping (Jonassen 1993; Diekhoff, 1983) which lays a basis for problem solving as an important component in any learning environment.

Concept mapping supports deductive learning (James and Gardner, 1995:21) as students can create an overview of all elements in the visual field, and they have the option to investigate further each element in the field. This can satisfy the 'association of contiguity' (Mayer, 1992) by involving students in creating links between concepts in the visual field.

Concept maps could be constructed to represent the structure and inter-relationships between components of a qualitative research proposal. If students can create a network of links through a concept map, they will be more motivated in designing research proposals.

### Support Tools: Checklists and Worksheets

Qualitative research proposals have a particular structure with a number of components. There are number of explicit and implicit links which exist within and between sections. The components and links could be grouped into different types and compiled in a form of the following checklists:

- General checklist
- Editing checklist
- Logical links checklist
- Research methodology checklist.

Worksheets could be constructed for different sections of a research proposal. Furthermore these worksheets help students to accomplish smaller tasks at a time and therefore focus on specific sections. Additionally, it can help students create a bigger picture of the structure and the outline of a research proposal thereby preventing fragmented knowledge.

For example, the worksheet could contain the following components: the topic, the problem statement, the purpose of the study and research questions.

### Logical Tools

Mende (2005) point out that students lack skills in creating complex arguments. Students are not appropriately taught how to incorporate core ideas into paragraphs and how to link core ideas within a section.

Outlining tools for writing scientific reports (for example, the paragraph outline, the branching diagram, the nucleus diagram) (Mende, 2005) are inadequate in helping students to understand qualitative research procedures.

According to Mende (2005) inference trees are insufficient in complex argument construction. This author proposes the tree structure in order to create complex arguments and to detect reasoning errors. The tree structure is represented as a hierarchy of modules, similar to modular hierarchy of program flowchart (Mende, 2005).

The researcher of this study suggests inference maps instead. Inference maps comply with human information processing capabilities, allowing students to link core ideas within and between paragraphs in order to create a complex argument. Inference maps are placed within the visual field of students.

Inference maps can be used in a synergy with concept maps. Furthermore, inference maps might contribute to the representation of multiple links within a qualitative research proposal.

### Research Design Templates

Finding similarities and differences between different research proposals will help students in designing and writing their own research proposal. This could be achieved using a research proposal design template. For example the following components of a design template has been found relevant for this study:

- Selecting a focus
- Identifying critical questions
- Stating a rationale
- Conducting a literature review
- Locating a theoretical framework
- Preparing a data collection plan
- Planning for data analysis strategy
- Anticipating the report outline
- Dealing with validity and reliability concerns
- Acknowledging the limitations of the research (Vithal & Jansen, 2004: 3)

Multiple exercises are necessary in writing research proposals by introducing small units gradually.

## RESEARCH METHODOLOGY

This research can be described as descriptive, exploratory, seeing that the learning experience of students are being investigated relating to a specific context (Yin, 1994; Creswell, 1994; Merriam, 1998). Qualitative research design characterises the complexity of data and the need for simultaneous analysis and data gathering procedures. In this study the researcher interest was to obtain a global picture of the students' experience of learning qualitative research design under different design tools.

### Sampling and Procedures

One group of students were identified: Twelve master students enrolled for the MCom degree in Information Systems at the University of the Witwatersrand. Participants presented a purposive convenient sample (Merriam, 1998). Information-rich cases are those from which a great deal of knowledge may be acquired about issues of central importance (Patton, 1990:169; Merriam, 1998).

Students were taught qualitative research design using various design tools: concept maps, support tools (checklists and worksheets) and inference mapping. Tasks have been allocated such as having students to analyse and discuss different qualitative research types found in various research papers and research proposals.

Expert-novice type of interaction was reflected during analysis and discussion of qualitative research proposals and papers in a form of cognitive apprenticeship. The teacher also acted as an expert demonstrating and modelling qualitative research design activities.

Students were observed during four workshops on qualitative research design. The workshops were presented once a week for four weeks, with duration of two hours per session.

The researcher played the role of participant-as-observer and collected the rich detailed data obtained from informants in natural settings (Burgess, 1984: cited by Jakovljevic, 2002).

### Data-Collection Methods

The data was collected by means of observations, and documents analysis (assignments). Data were gathered through multiple data gathering methods which satisfy the criteria for triangulation (Yin, 1994; Merriam, 1998).

Students were observed and their experiences related to learning qualitative research design through different tools were evaluated. The researcher of this study conducted the whole process of observation.

Data gathered through observation were recorded immediately after the workshop in a form of observer comments (Yin, 1994, Creswell, 1994).

Observation in this study relates to an extensive description of the learners', thoughts and feelings expressed in words, interactions and events.

Data were processed, consolidated and analysed reflecting students' actions, words and events during the qualitative research design workshops (Merriam, 1998).

### Data Analysis

According to Yin (1994:102) "data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial prepositions of a study". Data analysis in this study is based on content analysis (Creswell, 1994, Merriam, 1998). A constant comparative method was applied in analysis of observation data. During the process of analysis three categories were derived.

### The Assessment of Trustworthiness

Merriam (1998) suggests a few strategies to improve internal validity, which were considered in this study. These include peer/colleague examination (Lincoln & Guba, 1985:313). Reliability refers to the possibility of replication of the same context and the same sample (Shongwe, 1996). A rich description of phenomena, which was embedded in a theoretical framework, contributed to the internal validity of this study.

## RESULTS

### Findings Regarding the Students' Experience of Different Design Tools During the Qualitative Research Design

Emerging from observations relating to the students' experience of the implementation of different design tools during learning qualitative research design, the following findings were derived:

- a) The understanding of different components and internal links within a qualitative research proposal can flourish through the appropriate use of concept mapping  
During the analysis and discussion of qualitative research proposals and papers, students expressed the satisfaction when concept maps were used. They attentively followed the presentation of different components of qualitative research papers and proposals and their multiple links through concept maps. Perhaps the concept maps gave them an overview of the whole research paper. A comment made by one student was that concept maps "open an easy way for forming a network of links" and "help in analysis of a complex structure of paper".
- b) Logical tools guide help students in the construction of arguments.  
The students were encouraged to apply their previous knowledge on inference trees in the construction of an argument. They were motivated to present a visual outline of arguments and conclusions in the form of a diagram or a tree. The students were encouraged to use imagination and inventiveness in making links between core ideas in paragraphs during the construction of complex arguments.  
Students acknowledged the value of inference trees in making logical conclusions, although they were reluctant to use this tool. It was observed that students were reluctant to construct inference trees themselves.  
In order to experience argument construction, they enjoyed a simple method of drawing lines between core ideas in a research proposal. This is referred to as mapping activities, which they found interesting.  
They commented that, 'there is a lack of knowledge in an argument construction'... 'Research papers are too complex'. They showed a great deal of attention during demonstration of an argument construction using inference mapping.
- c) Provision of checklists and worksheets with smaller tasks at a time, help students to focus on more specific sections within a qualitative research proposal.

It was observed that students discussed the components of worksheets and checklists with great interest and motivation. They were immersed in discussions, asking questions, expressing their opinions and frequently comparing different proposals. Their discussions were very active, making the impression that dividing a qualitative research proposal into smaller sections helped them to focus on smaller units and consequently to the understanding of a research paper as a whole.

- d) There is a need for a qualitative research design template and an extensive practice in writing research proposals  
Similarities and differences between the structure of qualitative research proposals and papers were discussed.  
Few examples of a design template were presented with the following components: the topic, the problem statement, and the purpose of the study and research questions.  
One student commented, "I don't know how to start...how to find a topic". A range of comments suggested that skills in writing a research proposal can be achieved through a longer time period. It was observed that students easily understood the template and produced clear examples from their field of interest.

## DISCUSSIONS

In line with research findings it comes as no surprise that the use of concept mapping has a special place in the facilitating understanding and writing qualitative research proposals.

The step-by-step approach through concept mapping provides learners with the opportunity to map their own knowledge structure and to develop structural knowledge, (Jonassen, 1996) supporting deductive learning (James & Gardner, 1995:21).

Students can create an overview of all elements in the visual field and they have the option to investigate each element further in the field. The research findings support the importance of using concept mapping, particularly in developing an insight and creativity (Jonassen, 1996). Students should rely on their own perseverance, creativity and self-confidence, which is highlighted during mapping of their knowledge base (Jonassen & Wang, 1993).

The incorporation of design templates makes it easier to select and sequence learning experiences (Johnson, 1997; Jakovljevic, 2002). Numerous checklists and worksheets gave students a sense of orientation and minimized information overload during the analysis of qualitative research proposals.

DeLuca (1992:29) remarks that a "teacher should establish a sequence of instructions that will encourage learners to think independently". This could be aided by the implementation of cognitive apprenticeship.

Inference mapping helped students in developing a good conceptual overview of methodological and logical components of a research proposal.

Provided the environment in which inference mapping is utilised and nurtured through creative involvement of the teacher (Eggen & Kauchak, 1996:323) could influence effective generation and the refinement of arguments within a qualitative research proposal.

The literature review and findings indicate that students need multiple design tools to support their preparation in writing a qualitative research proposal. Students should be guided through the integration of an explicit set of guidelines as well as tools such as concept mapping, logical tools, checklists, worksheets and design templates.

## IMPLICATION FOR INSTRUCTION

Based on findings the following paragraphs highlight some issues necessary to improve the instruction when dealing with the facilitation of qualitative research design in an IS context:

Cognitive apprenticeship combined with visual tools such as concept maps, checklists, worksheets, logical tools, and design templates could promote better understanding of a qualitative research proposal. Students need to develop an understanding of different components and

links within qualitative research proposals under the integration of specific guidelines, extensive exercise and design tools.

Designing instruction around this integration can help students to develop skills in writing qualitative research papers.

In conclusion, different ideas on the facilitation of writing qualitative research proposals can be used for further investigation of a variety of design aspects relevant for improving the implementation of qualitative research design in the Information Systems context.

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