

Analysing qualitative data using an iterative process

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Abstract

Analysing qualitative data using a single and/or multiple data gathering strategies, is a painstaking exercise, and can often be a challenging for beginning researchers. The qualitative data can be analysed using many techniques to unveil the reality. An iterative process is one of the techniques employed by researchers in analysing qualitative data. This paper presents a case of how qualitative data, which have been gathered using multiple data gathering strategies (interview, observation and document analysis), were analysed iteratively using five major techniques. This paper illustrates how researchers may grow their own understanding when employing an iterative process to generate meanings from qualitative data.

Key words: iterative, qualitative, data, generate, analysis, interpretive, patterns, categories, themes, process, theory, meaning, inductive, deductive

Introduction

Interpretive qualitative case studies employ a number of different techniques to generate knowledge from the qualitative data. Each technique needs to be systematically and explicitly described for quality research findings (Matthews & Ross, 2010; Newby, 2010; Sarantakos, 2005). Interpretive qualitative case studies apply an inductive analysis to generate the realities from the qualitative data (Birks & Mills, 2011; Butterfield, 2009; Glaser, 1992, 1994; Glaser & Strauss, 1967; Hodkinson, 2008). An inductive analysis is an iterative process to sort and order qualitative data such as interviews, observation and documents and generate these data into units of meanings, categories, patterns and themes, which form sets of abstract information (Cohen, Manion, & Morrison, 2011; Creswell, 2009; Punch, 2009). An iterative means one has to repeatedly revisiting the data or going back and forth repeatedly on the data. This whole process “involves moving back and forth between concrete bits of data and abstract concepts, between inductive and deductive reasoning, between description and interpretation” (Merriam, 1998, p. 178).

In the study this author undertook, the qualitative data were examined in two ways that included interpretive criteria to compare and contrast the semantics to gain insights into the language meanings and terms social activities (Cohen et al, 2011), including classroom teaching-learning interactional behaviours and actions from teachers and students (Berg, 2007).

Inductive interpretive criteria are concerned with data being interpreted and analysed from the perspectives of the participants using systematic and explicit rules (Cohen et al., 2011; Creswell, 2007), while semantics means the data are interpreted and analysed by relating and listening to meaning of words, phrases, sentences and paragraphs to understand better from the perspectives of the participants of that particular socio-cultural setting (Sarantakos, 2005).

The five major techniques which the researcher applied to analyse the qualitative data inductively, including data organization (Best & Kahn, 2006; Patton, 2002), generation of unit of meanings, construction of categories, developing themes and writing the theory (Cohen et al., 2011; Glaser, 1978, 1992, 1994; Glaser & Strauss, 1967; Matthews & Ross, 2010; Newby, 2010). These five major iterative techniques the researcher employed are illustrated below, and are expanded upon in the following paragraphs.

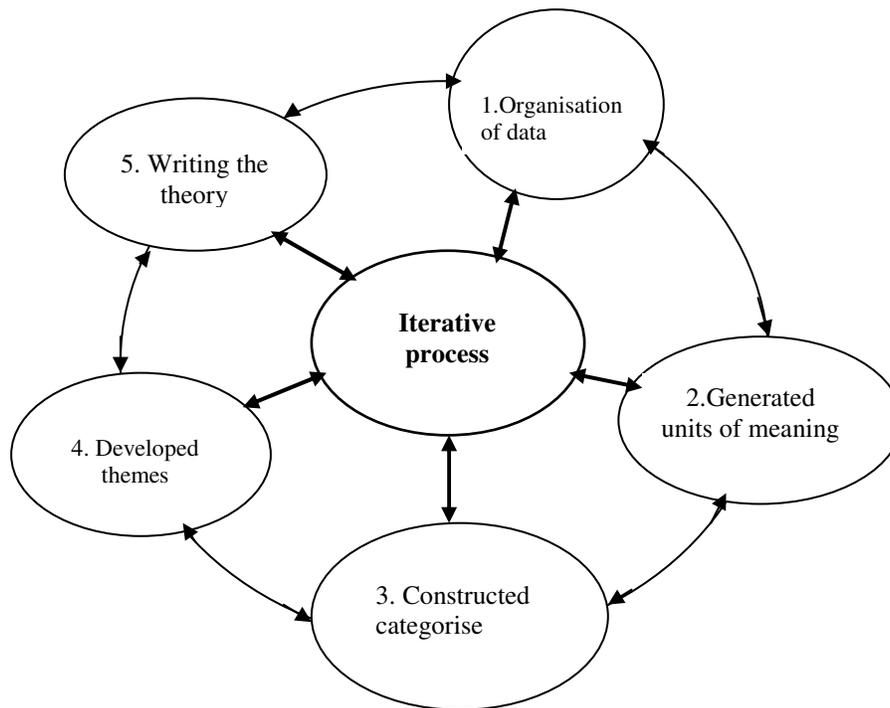


Figure1: Iterative framework for interpreting qualitative data

Organization of data

Organization is important for quality management and analysis of voluminous qualitative data which are generated from audio-taped, videotaped and documents in the interpretive qualitative study (Best & Kahn, 2006; Creswell, 2007; Patton, 2002). The researcher organized the teachers' audio-taped, videotaped and documents separately from the students' audio-taped and documents for each case study in each grade level (Grades 6, 7 & 8). The

audio-taped and videotaped data were then transcribed “to represent what was said or mean in a particular event” (Gibson, 2010, p. 297), while the documents were copied and photocopied. Transcribing audio-taped and videotaped data was really a painstaking exercise. For example, a 30 minutes audio-taped data took four to five hours to transcribe first, while a 40 minutes videotaped lesson took six to seven hours. Initial transcriptions were repeatedly gone over eight or nine times, and finalized for analyzing.

Generated unit of meanings

Unit of meanings refers to “words, items, sentences, characters, themes, ... meanings and symbols” (Sarantakos, 2005, p. 303), which are indicated in the text data by codes. Coding means placing tags to, or label the text data with numbers, words and symbols like letters of the alphabet (Birks & Mills, 2011; Lincoln & Guba, 1985; Sarantakos, 2005) to crack the data to identify the meanings (Matthews & Ross, 2010). The researcher created a variety of codes, comprised of letters and numbers, and placed these as pseudonyms or codes for teachers’ and students’ transcribed data. For example, in one of the case studies (rural primary school), a grade six blue teacher was coded or labelled with pseudonym ‘UPTI506’ for interview data, ‘UPV301’ code for videoed data in urban primary school, and ‘UPTD301’ for document, while female student focus group one in grade six was labelled ‘UPSI201’ as a pseudonym or code for interview data and ‘UPSD201’ for documents. Each case study had different codes for grades 6, 7 and 8. Then, the researcher read and re-read the transcriptions several times to understand fully, and underlined word-by-word, “phrase-by-phrase, sentence-by-sentence, paragraph-by-paragraph” (Cohen et al., 2011, p. 561), as unit of meanings or concepts and coded these with letters of alphabets. For example, Table 1 and Table 2 illustrate extractions of coding from interviews and videoed data of the rural and urban primary schools.

Table 1: Example of coding text from an in-depth interview

Rural Primary School
In-depth interview with teacher RPTI506

I felt that, with upper primary classes, it is easier in organizing teaching and learning activities in line with the curriculum booklets such as the syllabuses and teachers guides in terms of programming and teaching. I normally teach Mathematics, MAL (Making a Living) and Arts. (T) & (L). (RPTI506). In planning upper primary teaching programs, I used both the old curriculum materials including the new OBE curriculum materials in terms of planning. (P). (RPTI506). Interpretation of OBE into my teaching programs (I) (RPTI506) The syllabuses and the teachers’ guides have been produced by the National Education Department and they came out to schools that we are using now to program but the problem is with the resource materials, the backup curriculum materials that will be used to implement these teachers’ guides and syllabuses. That is giving me problem. (C) & (R-L) (RPTI506). Normally mi save mekim ol single outcome unit of work.

(SO) & (UW). (RPTI506) Bas long yialy overview blong me, bas long term and weekly overview me save making unit of work blong me ya em singol outcome like I'm teaching Maths, mi save making blong Maths tasol. (P-SO) & (UW). (RPTI506) Na Arts em yet. Sampela taim mi lukim olsem easy long mi integratim tupela subjeks, mi save integratim (IN). (RPTI506).Taim mi laik planim ol teaching programs belong me, mi save considerim ability levels belong ol sumatin. (SAB) (RPTI506)

Guide to interpretation

Underlining = indicates a salient point being made

RPTI506 = rural primary teacher interview record for grade 8Blue class teacher;

L = learning T = teaching;

C = curriculum; I = interpretation; IN = integrate; P = planning; R-L = resource lack; SAB = student ability; SO =single outcome; UW = unit of work; P-SO = planning single outcome;

Table 2: Example of coding text from a videoed lesson observation

Urban Primary School

Videoed Lesson Observation Analysis for teacher UPV304

T: Ok, our revision questions: Do we really know where the first, ah, settlers came to Papua New Guinea? Do we really know where the first people or the first settlers came from to Papua New Guinea? Do we really know? Hands up. **R:** Yes, no. **T:** Do we really know? Yes or no. **R:** Yes, no. **T:** Ok, but from evidence and clues from the historians we can see that ah see where people first came to Papua New Guinea and where they first settled. (T-IRQ). UPV304. [*The teacher gave hand-out to students and asked to read then answer questions based on the readings in the hand out*]. **T:** Ok, I will give out the notes then you will read and then I will put up some questions for you to answer from the notes. (T-ISP). UPV304. **T:** I have two hand outs: One is the first people and the other one is how these people lived. When the first settlers were came to Papua New Guinea? I want you to sit in a pair so that you can share the hand outs, in twos or in threes. You can come up here. Ok, as soon as you get the hand-out I want you to read. Start reading! Five minutes reading. [*While students were reading, the teacher printed 4 questions on the chalkboard*]. (T-BE), (T-AE), & (T-BMU). UPV304.

Guide to interpretation

T = teacher; R = respondents;

UPV304 = urban primary video record for grade 7 Red class teacher

T-IRQ = teaching, introduction, revision question; T-ISP = teaching-introduction, stating purpose; T-BE = teaching-body explanation; T-AE = teaching-activity explanation; T-BMU = teaching, body material use

Coding unit of meanings or concepts was from the participants' own words (both spoken and written) and from researcher's own created meanings (Cohen et al., 2011; Glaser, 1994; Glaser & Strauss, 1967; Newby, 2010). A continuous and thorough reading and sifting was done to refine and redefine the unit of meanings so to gain understanding of the salient feature of the particular situation being studied occurred (Cohen et al., 2011; Fraenkel, Wallen, & Hyun, 2012; Glaser, 1992; Glaser & Strauss, 1967; Matthews & Ross, 2010; Sarantakos, 2005). A total of 205 codes of meaning or concepts were generated from case study one, and 178 codes of meaning (concepts) from case study two.

Constructed categories

Lincoln and Guba (1985) define categorizing as "a process whereby previously, unitizing data are organized into categories that provide descriptive or inferential information about the context or setting from which the units were derived" (p. 204). The researcher read and re-read the units of codes or concepts several times to understand the meanings contained pertaining to the topic of this study and research questions. Then the units of codes or concepts were put or grouped under each of the three research questions. This grouping of categories is illustrated in Table 2 below.

Table 3: Grouping of categories with research questions

Key question: <i>What factors are influencing teachers' decisions and actions in their implementation of the national curriculum in upper primary schools in PNG?</i>	
Supporting questions	Categories and sub-categories
<i>What factors are influencing teachers in their interpretation, planning and delivery of the national curriculum in classrooms?</i>	Interpretation
	Read and understand
	Interpretation, planning and teaching, challenge in interpreting curriculum, interpretation and resource lacking
	Planning
	Planning process
	Planning thematically and stand along,
	Students' behaviour and attitude and understanding
	Students' behaviour, learning and Curriculum content challenge, curriculum model and learning, lack resources
	Professional development support
	Professional development and learning, professional development, professional development and support

<i>What matches are there between the national curriculum, the teachers' micro-curriculum and the students-experience curriculum?</i>	Planning model Unit of work, planning teaching program, integrated outcome model, single or Stands alone outcome model , yearly plan, weekly/daily plan.
<i>What factors are influencing students' learning and how?</i>	Teaching Teaching and learning challenge, teaching and subject liking and disliking Curriculum content Curriculum content and learning, students' learning and learning difficulties, curriculum content Learning and activities and outcomes Activity challenge, subject liking, group activity, activity challenge and teacher assistance Teacher-student interactional behaviours Teaching assistance, teaching assistance and activity, teaching assistance and learning challenge, behaviour challenge, teaching assistance

Under each research question, the researcher further thoroughly read and re-read the code of meanings and constantly compared the similarities and differences for the case studies within and across (Birks & Mills, 2011; Cohen et al., 2011; Fraenkel et al., 2012; Glaser, 1992; Glaser & Strauss, 1967; Matthews & Ross, 2010) by asking the following questions (Johnson & Christensen, 2012).

- What commonalities are in the case studies?
- What differences are in the case studies?

Once the commonalities and differences in the unit of codes were identified, a further continuous through grouping and regrouping, integrating and re-integrating, linking and re-linking the concepts several times "into provincial categories on the basis of look-alike characteristics" (Lincoln & Guba, 1985, p. 204). After several modifications and shifting, the major categories and sub-categories, and their properties were emerged (Birks & Mills, 2011; Glaser & Strauss, 1967), and ordered these "categories hierarchically or tree-like way" (Matthews & Ross, 2010, p. 401). The categories and sub-categories were then reduced to "more generalized categories, whose properties and relationships to one another [were] provide[d] the beginning of a theoretical explanation of the data" (Hodkinson, 2008, p. 89). Based on the major categories and their properties, the themes were developed.

Developed themes

A theme is a key or broad idea that pulls together the major categories and their characteristics (Hodkinson, 2008). Based on core categories, the researcher developed the themes, and linked each other. There were three major themes developed that linked the categories, sub-categories and their characteristics systematically and a theory grounded in the data was emerged. Table 3 below illustrates the three themes and major categories.

Table 4: Themes and categories illustrated with research questions.

Key question: What factors are influencing teachers' decisions and actions in their implementation of the national curriculum in upper primary school in PNG?		
Sub-questions	Themes	Major categories
What factors are influencing teachers in their interpretation, planning and delivery of the national curriculum in classrooms?	Teachers' micro-curriculum	Teachers' interpretation of the outcome-based national curriculum. Teachers' planning of micro-curriculum. Pedagogies. Teachers' values and beliefs. Teachers' perspectives on the students' attitudes and behaviors. Issues with national curriculum implementation. Professional development support
What matches are there between the national curriculum, the teachers' micro-curriculum and the students-experience curriculum?	Models of micro-curriculum	Integrated outcome model Single outcome model
What factors are influencing students' learning and how?	Student-experienced curriculum	Students' perspectives on the teachers' teaching. Students' perspectives on the national curriculum implementation. Students' learning outcomes. Students' attitudes and behaviours. Students' perspectives on the teachers' attitudes and behaviours

This detailed process involved "a deep understanding of the storyline" (Cohen et al., 2011, p. 562), so the researcher went back and forth several times reading and re-reading, to understand collectively the initial unit of codes,

categories, sub-categories and their characteristics as well as the themes to ensure the theory was firmly linked to the data.

Writing the theory

When the researcher was convinced that the “analytical framework forms a systematic substantive theory” (Glaser & Strauss, 1967, p. 113), the researcher then wrote this theory. The researcher gave precedence to the categories and sub-categories and described them in line with the themes and supported by actual participants’ verbatim data. In writing the theory, the researcher explained the categories that were created, and described the categories emerged from the participants themselves (Cohen et al., 2011; Glaser & Strauss, 1967).

Summary

The researcher employed five iterative techniques (organised data, generated units of meanings, constructed categories, developed themes, wrote theory) several times, within the qualitative data and unveiled the realities, from the perspective of the participants. Within each of these techniques, the researcher developed a participatory relationship, and iteratively constructed knowledge by listening, writing, skimming, reading, explaining, deciding, and revisiting the data, as shown in Figure 2 below. In so doing, the researcher applied both deductive and inductive reasoning, and developed ideas and concepts.

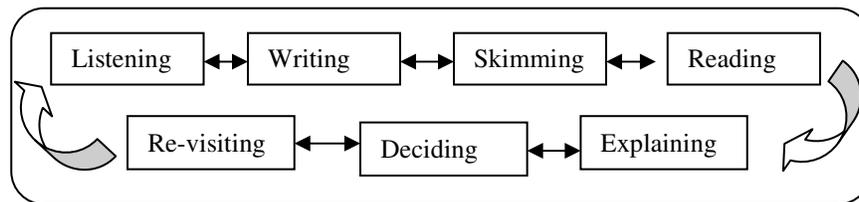


Figure 2: Strategies for constructing knowledge during data analysis

Listening is the process of capturing the actual words of the participants, while writing is copying the words. Skimming is the process in which the researcher patterns his or her thinking and thought processes when interacting with qualitative data to get an overall impression, while reading is the process; the researcher constructs meanings from the data. Deciding is when the researcher makes decisions to judge (evaluate) or creates meanings from the participants’ perspective. Revisiting is the process where the researcher ‘audits’ the theory s/he writes, and confirms with what the qualitative data represent. Thus, the researcher mediates upon, internalizes and grows his or her own thinking and thought processes independently.

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Associate Professor Dr Joseph Kekeya comes from the Western Highlands Province in PNG and is the Dean of the Faculty of Education at Divine Word University. He completed his doctoral studies in New Zealand in 2013. His doctoral study research employed multiple qualitative data strategies (interview, video observation and documentary analysis) with teachers and students in two schools, one an urban church agency school and the other a rural government agency school in PNG. The findings unveiled the realities of the implementation of the PNG outcomes-based national curriculum. His research interests include leading learning, and socio-cultural influences on curriculum development and implementation.

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