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Qualitative data analysis: making new discoveries and aligning old strategies

R. K. Gurdial Singh

Institut Perguruan Bahasa Melayu Malaysia

M. L. Jones

University of Wollongong, mjones@uow.edu.au

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**Qualitative Data Analysis:
Making New Discoveries and Aligning Old Strategies.**

Ranjit Kaur a/p Gurdial Singh
Institut Perguruan Bahasa Melayu Malaysia (IPBMM),
Lembah Pantai,
59990, Kuala Lumpur,
Malaysia.

Email: ranjitek_ibmm@yahoo.com

&

Michael Jones (PhD.)
School of Management and Marketing,
Faculty of Commerce,
University of Wollongong,
Australia.

Email: mjones@uow.edu.au

Abstract

Qualitative research is fast gaining popularity both locally and globally as a method of conducting research. Hence, new methods and paths are constantly being developed to assist researchers in further improving and enhancing qualitative data analysis. Today, computer assisted qualitative data analysis software has been developed for analysing qualitative data. One such 'state-of-the-art' tool that has made inroads in various fields of qualitative research is NVivo. This paper will explore some inherent facilities available in NVivo that were used to analyse a multi case, single site case study that attempted to understand the unique naturalistic situation of learners' asynchronous online interactions (AOI) towards achieving learner autonomy in an online learning environment. The data collection techniques employed were conducting semi-structured interviews with a tutor and six learners, analysis of learners' learning logs and analysis of learners' threaded online interactions. This data were then further triangulated. As a

result, the researchers were able to make new discoveries and align old strategies to accomplish their mission of analysing the case study data. This paper will discuss and explore the six strategies that were used in this quest. The strategies include: working with data, organising data, breaking data into manageable units, synthesizing data, searching for patterns and deciding what and how to tell others. Finally, one must remember that NVivo is merely a tool and the quality of research that emerges is dependent on the researcher's own imagination and reflections into the data.

Introduction

Qualitative research is fast gaining popularity both locally and globally as a method of conducting research. Johnson notes that qualitative methodologies are powerful tools for enhancing our understanding of teaching and learning and that they have “gained increasing acceptance in recent years” (1995, p.4). Strauss and Corbin (1990) further assert that to obtain new perspectives on things about which little is known, qualitative methods are used. Since the researcher acts as the “*human instrument*” in the data collection, qualitative research approaches employ the natural setting as a source of data (Lincoln & Guba, 1985; Merriam, 1988; Eisner, 1991). This way, the researcher enters the respondent's world and through ongoing interaction, seeks insights, perspectives and meaning of their world whilst maintaining ‘*empathic neutrality*.’ Patton asserts that empathy “is a stance towards the people one encounters, while neutrality is a stance towards the findings” (1990, p. 55).

In line with these developments in qualitative research, new methods and paths are constantly being developed as a means to assist the researcher in further improving and enhancing qualitative data analysis. Traditionally, qualitative data analysis has always been associated with sifting through bulky and often large volumes of transcripts, case notes, articles and even pictures which can be quite tedious and messy. However, today, computer assisted qualitative data analysis software (CAQDAS) has been developed for analysing qualitative data. One such 'state-of-the-art' tool that has made inroads in various fields of qualitative research is NVivo (QSR International Pty Ltd 2002).

In the 1980's when the level of technology began to improve the ubiquity and usability of personal computing, the popular choice for qualitative data analysis was NUD*IST (QSR International Pty Ltd 2002). The program has been through several iterations since this time and has been developed into the program which is used today, known as NVivo. Hence, NVivo is considered a front-line innovator in qualitative data analysis. It is used to organise and analyse complex qualitative data such as that which are required in the fields of academic, government and commercial research. In addition, NVivo is used for a wide range of analytical methods such as organisational analysis, action or evidence-based research, discourse analysis, grounded theory, conversation analysis, ethnography, literature reviews, phenomenology, case studies, biographies and mixed methods research (Gibbs, 2002; Dey, 1993).

The Study

This study entailed a multi case, single site, case study to understand the unique naturalistic situation of learners' asynchronous online interactions in an online learning environment. In other words, the study would investigate learner autonomy through one mode of computer-mediated communication i.e. asynchronous online interactions (AOI) in achieving their learning tasks. Learner autonomy here refers to learners' abilities in taking responsibility in managing their own learning. In connection with this, Merriam (1998, p.19) points out that a case study is "employed to gain an in-depth understanding of the situation and meaning for those involved. The interest is in process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation". Hence, in this case study the researchers investigated this case study by looking at the process and context of AOI in an attempt to make new discoveries. Therefore, in an attempt to gather information about learner autonomy through AOI, the study aimed to achieve the following research objectives:

- a. To identify and describe learners' and tutor's views of asynchronous online interactions (AOI).
- b. To examine and describe learners' participation in asynchronous online interactions (AOI) in accomplishing their learning tasks.
- c. To identify and describe learners' abilities in achieving learner autonomy through asynchronous online interactions (AOI) in the following areas: planning, monitoring, decision making and computer skills in accomplishing their learning tasks.

As a means of achieving these objectives, the study employed a descriptive research methodology. Multiple techniques were employed in the data collection process

because the use of a single approach to understanding the learning and teaching process will usually yield only limited and sometimes misleading data (Cohen & Manion, 1989). Hence, the data collection techniques used in this case study included administering a questionnaire, conducting semi-structured interviews with a tutor and learners, analysis of learners' learning logs and analysis of learners' threaded online interactions. In an attempt to gain insight and deeper understanding of learner autonomy through AOI, data were analysed using the computer assisted qualitative data analysis software, NVivo. These data were then further triangulated.

As a means of achieving all these aims, this paper will explore the researchers' experience in using the many facilities accorded by NVivo to analyse the case study data; how they made new discoveries; and how they were able to align strategies to provide thick descriptions when investigating a contemporary phenomenon within its real-life context (Yin, 1984). In this study the phenomenon is learner autonomy through asynchronous online interactions in the context of an online learning environment.

Using NVivo to Analyse Case Study Data

Bogden and Biklen (1982, p. 145) define the data analysis process as “.... *a process of systematically searching and arranging the interview transcripts, field notes and other materials that you accumulate to increase your own understanding of them and to enable you to present what you have discovered to others. Analysis involves working with data, organizing it, breaking it into manageable units, synthesizing it, searching for*

patterns, discovering what is important and what is to be learned and deciding what you will tell others”.

Using this as a guideline, the researchers embarked on a quest to analyse the case study data using various strategies and utilising the inherent features of NVivo. Below are some strategies that were used by the researchers’ to analyse the case study data.

Strategy 1: Working with data.

The first step in this case study data analysis entailed working with the data. This stage of the data analysis began during the data collection or fieldwork stage itself when the researchers started thinking about the data (Gibbs, 2002). As soon as data were collected the researchers began working with them. This process of working with the data in qualitative terms has been referred to as “interpreting” (Silverman, 1993), “transforming” (Wolcott, 1994) and “making sense of data” (Hammersley & Atkinson, 1995).

In short, working with the data was an ongoing process. It started the moment the researchers went into the field and continued throughout the data collection process and well into the final stages of data analysis and reporting the findings. In this study, the researchers began working with the data by compiling qualitative data from various sources i.e. interview protocols, learning logs and threaded asynchronous online interactions.

Working with data also involved ensuring validity of the data. In this aspect, Yin (1994) points out that to increase construct validity of the study, each transcript draft

report should be given back to the participant being interviewed for review. This is sometimes referred to as peer review or peer checking or member checking. The concerned participant or in this case the respondents were asked to denote agreement or disagreement over the transcribed notes from the semi-structured interviews that were conducted. If there was disagreement, it was resolved by discussing the meaning of the sentence with the respondents and thereafter correction was made accordingly on the transcribed notes.

Yin (1994), when speaking about the case study research method, emphasised that multiple sources of evidences are used to triangulate data to address concerns with internal validity. Triangulation is viewed as a useful technique as it provides multiple perspectives on a single phenomenon (Cohen & Manion, 1989). In addition, triangulation is a process of using multiple data collection approaches to help ensure the validity of research findings (Denzin (1978); Mathison (1988); Merriam 1988). Mathison (1988) further explains that the use of multiple techniques such as interviews, document analysis and observation helps to strengthen the validity of research findings. Denzin (1978) describes three types of triangulation which he terms: data triangulation, investigator triangulation and methodological triangulation. According to him, methodological triangulation refers to the use of multiple data collection methods such as interviews, observation and document analysis. Based on these elaborations, in this study, methodological triangulation was used.

Strategy 2: Organising data

Soon after data were collected, the researchers set out to organise them. The first round of organising data entailed transcribing all the data and saving it into a word processing program i.e. MS Word using different folders and giving meaningful file names. Before data were imported into the NVivo program, the researchers had to modify the data files to ensure there was compliance with the software. This involved ensuring the files contained no incompatible objects. The easiest way to do this is to convert the MS Word files (extension .doc) to rich text format files (extension .rtf). These files included the interview protocols with the tutor and six respondents, six respondents' learning logs and their threaded AOI with their tutor whilst pursuing the online B. Ed (TESL) course.

Once all relevant files had been imported into NVivo, the next stage of organising data involved coding. The importance of the coding process in qualitative research cannot be underestimated. In fact, Strauss (1987, p.27) stressed that coding is an essential procedure because “any researcher who wishes to become proficient at doing qualitative analysis must learn to code well and easily. The excellence of the research rests in large part on the excellence of the coding’. Therefore, coding here refers to the process of identifying one or more units of text or passages that exemplify some theoretical or descriptive idea. Gibbs (2002) adds that “coding in qualitative analysis is a way of organising or managing the data. All the original data were preserved. Codes were added to the data. In fact, typically, text may be densely coded; not only will most text be assigned a code but much will have more than one code attached to it” (2002, p. 4). In NVivo this process of in-vivo coding is shown in the Document Browser by the coding stripes.

Following the precepts of Grounded Theory (Strauss and Corbin 1990) NVivo uses three types of coding. These are open coding, axial coding and selective coding. The data analysis used in this project utilised open and axial coding. The coding was accomplished by connecting each item, word, sentence and passage of a document to a node (or category). According to Gibbs (2002), a node is not just mere labelling, it is a way of "...connecting a theoretical concept or idea with passages of text that in some way exemplify that idea" (Gibbs, 2002, p.57). This goes to show that a node entails a lot of analytical thinking in qualitative analysis especially in determining the reliability and validity of the coding process. Table 1 illustrates some of the conceptualisation that took place with regard to codifying the data into nodes.

Table 1 Some examples of what was coded in the case study

Learner Autonomy Abilities	Learners' abilities in four aspects i.e. planning, monitoring, decision making and computer skills.
AOI	How learners used the AOI Interface i.e. <i>myLMS</i> as well as whether the online learning platform was easy or difficult to use.
Facilitation	What roles did learners' and tutors perform during their AOI.
Users Views of AOI	Tutor and learners' views, feelings, advantages and problems regarding their AOI.

In terms of coding, one aspect that initially challenged the researchers in selecting the relevant text was how big or small the selected text passage should be. Therefore, the researchers commenced with open coding. Open coding here meant that the researchers coded selected key words and sentences from the coded text by reading it reflectively and thereafter identified corresponding categories for each node. The title for each node should by no means be a description of the text (Gibbs, 2002). It should actually reflect and relate to a more general idea or phenomenon. For example, when Respondent 1 (R1)

said “*Some want you to go online 10 times, some 20 times and some say 5 times you get the grade. There is no proper management of it*”. If we were to take the literal meaning of what R1 said it could be labelled as users’ views but following this rule, the researchers labelled the node as “Facilitation”.

As a result, the first round of open coding for the first respondent totalled 320 free nodes. Initially the researchers resorted to densely coding most of the data as it provided practice to the researchers who were coding data for the first time. Secondly, they discovered that by doing this it provided width and depth to the node structure. However, having coded all documents for the first respondent, the researchers soon realised the short-comings of doing this, as the number of free nodes kept increasing. In addressing this issue, Gibbs (2002) states that longer passages are easier to understand compared to shorter ones because it has both content and context and this enables one to understand the meaning within the context. Emphasizing this aspect, Bogden and Biklen (1982) stress that in a qualitative study, contexts are important because actions can best be understood when studied in the setting in which they occur. On the other hand, although shorter passages are easier to code, as they exemplify only one idea, they may lack reference to their original context. Having discovered this through ‘trial and error’ the next round of coding for the second and subsequent respondents involved coding longer passages.

Once categories began to form, the researchers then set to code the data for the second and subsequent four respondents. Here on, if the coded texts supported the existing nodes they were added onto the existing nodes. However, if the coded texts

contained new information another node was added. Gradually, the researchers were able to see the data expanding in terms of width and depth of node structure.

Strategy 3: Breaking data into manageable units

The next round of coding was axial coding (Strauss and Corbin 1990). This meant that the researchers had to refine, develop and inter-relate the categories that were coded for each document. This basically entailed breaking data into clear and manageable units of analysis. One way was by selecting and merging the listed free nodes in the Node Browser. This resulted in hierarchically arranged tree nodes. These tree nodes were deemed important as they had a place in the tree structure as well as clarifying the relationship between nodes in the tree. Some examples of tree nodes that were identified included:

- **AOI** (Course description, course materials, discussions)
- **Learner Autonomy** (Planning, Monitoring, Decision making, Computer skills)
- **Support** (Peer, Family)
- **Facilitation** (Student role, Tutor role)

In NVivo, the relationship between nodes is determined by identifying whether the node is a parent, child or sibling. Figure 1 shows an example of this relationship between the identified nodes in this case study. For example the node ‘facilitation’ referred to the parent node and this node had two children i.e. ‘tutor role’ and ‘student role’. On the other hand, the node ‘tutor role’ had three children i.e. ‘monitoring progress’, ‘giving feedback’ and ‘building learning community.’ Simultaneously, nodes that share the same parent are called siblings. In this case study, ‘facilitation’ had two

siblings i.e. ‘tutor role’ and ‘student role’. As the analysis progressed the researchers found that the number of free nodes decreased as more and more tree nodes were identified and their relationships determined more clearly.

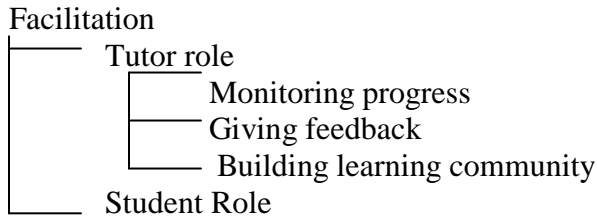


Figure 1 An example of a tree structure

This strategy also involved further refining of the coding process. In fact, this process was conducted throughout the life of this case study. From time to time, the researchers had to code, uncode and recode the data and constantly compared the coded text passages to fine tune the categories further. As a result of thorough and rigorous coding of documents, new categories of data began to emerge and this resulted in the researchers making a new and interesting discovery – an additional research objective/question. The researchers started with three research objectives/questions, but at this stage of data analysis especially upon reaching the point of saturation, they ‘discovered’ another theme emerging especially with regard to tutor and student roles in AOI. This clearly showed the power of NVivo in assisting researchers to discover new and emerging data. This new discovery succeeded in spurring and motivating the researchers towards moving forward and further aligning and concretising their data analysis.

Strategy 4: Synthesizing data

There are many ways one can synthesize data. As coding seemed to be a primary way of analysing data, the researchers constantly made sure that data were reduced from time to time. The researchers did this by tidying up the lists of free nodes and refining the definitions of each tree node. This way of synthesizing data is acceptable especially for case studies. In this case study the researchers were able to inject some additional flexibility and fluidity as the research was based on testing existing theories. However, the researchers made sure that they were not influenced by the hierarchy of the tree but instead allowed room for flexibility in the analysis to enable them to develop new branches thus allowing them to modify the tree and hence permitting a more critical analysis of the data.

Apart from merely indulging in descriptive writings, NVivo encourages the researchers to explore reflective thinking. According to Gibbs (2002) this is referred to as metadata and “...is written by researchers during the life of a project about the data, how they were collected and the process of data analysis” (2002, p. 83). In this study too, the researchers recorded metadata by keeping memos, data bite annotations, draft reports and mind maps about the case study project. Keeping and maintaining these documents from the beginning of the data collection process was deemed important by the researchers as it helped them to think analytically. More importantly, all these metadata can be modified at every stage and any stage of the project.

NVivo has some inherent facilities that assist the researchers in reflective processes. Some of the features that helped the researchers achieve this aim were to write and record their reflections about the data through data bite annotations and memos. All

these could be linked to any unit of text or passage in a document. In this study, the researchers started with making data bite annotations. Although, multiple links to a document or many documents could result in the researchers getting confused or getting lost in volumes of data but the advantage was that it helped them in having a better understanding of the data and this exercise would eventually help them in the writing up process. Figure 2 shows an example of a data bite annotation.

Role of tutor in OLD - involved in two-way communication, interactive, active and pose challenging questions that will benefit students and make them think critically - critical thinkers. Perhaps this is what is hindering every student from participating actively in OLD.

Figure 2 An example of a data bite annotation from the case study

Another means of synthesizing data was through writing memos. Glaser defines memos as “theorizing write-ups of ideas about codes and their relationships as they strike the analyst while coding ...it can be a sentence, a paragraph or a few pages” (1978, p. 83). However, when it came to writing memos, the researchers adhered to some basic guidelines mentioned by Gibbs (2002, p. 85). Some of these included:

- Write memos the moment the idea comes to mind.
- Memos are not about people/cases but are about nodes/concepts/ideas.
- Memo styles should be flexible.
- In order to audit trail the memos, date and time can be added to them.
- Memos can be modified anytime and there is no fixed length.

Since memos and nodes are symmetrical they can be linked both to the document or node and vice versa. One thing that initially plagued the researchers was what should be the content of the memo? At the beginning the researchers started with writing things

that were related to the nodes such as the importance of conducting AOI interactions from the respondents' and tutor's perspective, the way the respondents related their problems in getting tutor's prompt feedback, the tutor's reaction whether they were similar or alike etc. Once the researchers saw the importance of writing memos as a form of analytical thinking and as a means to support the development of the analysis and how all these would eventually add up towards the final write up, they began to fine tune them further by ensuring that the content of memos comprised the following aspects (Gibbs, 2002, p. 88);

- Reflective remarks where ideas from previous nodes and documents were merged.
- A new idea that was mentioned by a respondent in the node/document.
- To check and verify the quality of the data especially when you know that the respondent was not open, sincere or truthful.
- To identify anything that was surprising or puzzling.

The following is an example of a memo written for this case study.

What is the role of a tutor in an AOI environment? Tutor and respondents did not see eye-eye on this issue. In fact their responses via interviews indicated that they seem to be contradicting each other.

Based on the respondents' views of this study it is clear that a major concern among many of them was regarding the tutor's role or rather the role a tutor should play in a CMC environment. This study has brought forward many issues that relate to the tutor's roles.

It is clear that when the respondents in this study were given some attention by their tutor, they reciprocated with gratitude, thanks and felt that they were appreciated. This goes to show that when the tutor takes time to respond and encourage her students they tend to enjoy their learning.

Figure 3 An example of a memo

Strategy 5: Searching for patterns

All strategies of analysis mentioned so far are geared towards data reduction. Having employed these key strategies, the researchers then embarked on searching for common patterns towards analysing the theme of learner autonomy through AOI. This

has been termed as ‘pattern matching’ by Gibbs (2002) and Yin (1994). In short, the researchers made attempts to compare the patterns of results obtained from a study with patterns from past studies, knowledge or theory. Similarly, in this study too, the researchers hoped to obtain evidence that would support reviews of literature of AOI and the theoretical underpinnings of this study i.e. socio-constructivism through the analysis of all four research objectives. Hence, searching for patterns was considered an important activity in this qualitative study as it involved deciding and discovering all related issues regarding how learners participated in AOI and to what extent AOI and their tutor aided learners’ towards becoming autonomous learners. More importantly, to gather adequate information regarding the different levels of learner autonomy that was achieved by the six respondents of this study. In this aspect, the researchers employed the ‘Search Tool’.

The ‘Search Tool’ allowed the researchers to conduct very simple to very complicated searches. The researchers were able to vouch that the advantage in using this facility was that it ensured exhaustive, efficient, and complete searches. Interestingly, this tool also allowed the researchers to conduct inductive and deductive searches. When the researchers analysed the nodes and texts they were able to carry out inductive searches. On the other hand, by analysing the relationships between the nodes they were able to conduct deductive searches. This, in a way, ensured that data analysed using NVivo fulfilled the requirements of validity in coding. The search operations that this tool provided are shown in the diagram below.



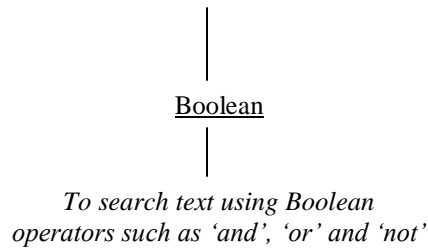


Figure 4 Examples of search operations

Strategy 6: Deciding what and how to tell others.

Gibbs (2002) stresses that many qualitative studies employ some basic analytic schemes or approaches. Some of these include structured analysis, grounded theory and narratives. In a similar vein, Yin (1993, 1994) explains that there are basically three types of qualitative case study designs i.e. explanatory, exploratory and descriptive in nature. Therefore, the final stage of this qualitative study that the researchers had to grapple with was on what and how to tell others i.e. reporting and writing. Since the researchers explored to investigate the ‘what’ and ‘how’ of AOI, therefore the researchers embarked on a descriptive and structured approach that consisted of explanation building of the phenomenon.

Through this analytical building approach the researchers had to develop support inductively to explain how learners participated in AOI , what were learners’ and tutor’s views regarding AOI, what roles the tutor and students’ played in AOI as well as to what extent the AOI aided them towards achieving learner autonomy viz. planning, monitoring, decision- making and computer skills. Whilst maintaining contact with the research objectives, they also had to constantly compare their explanations with those

from previous studies and find patterns that would link and match those studies or theories as well as explain any new and emerging findings regarding this phenomena.

On the question of how to tell others, the researchers explored some forms of visuals available in NVivo such as matrices, tables, charts, diagrams and models. All these different forms of visuals are intended to aid researchers in explaining, clarifying, summarizing and conceptualising their ideas and thinking. Tables of data in NVivo are called matrices. They are used to facilitate comparisons of data. Some examples of matrices include making case-by-case or single case comparisons. Charts and diagrams are used to show relationships between data. One example of this is models. The Model Explorer tool is used to build models in NVivo. In this study too, the researchers employed this facility to explain the question of what and how to tell others in the study. Below are some examples of models that the researchers churned by using data from nodes, cases and documents.

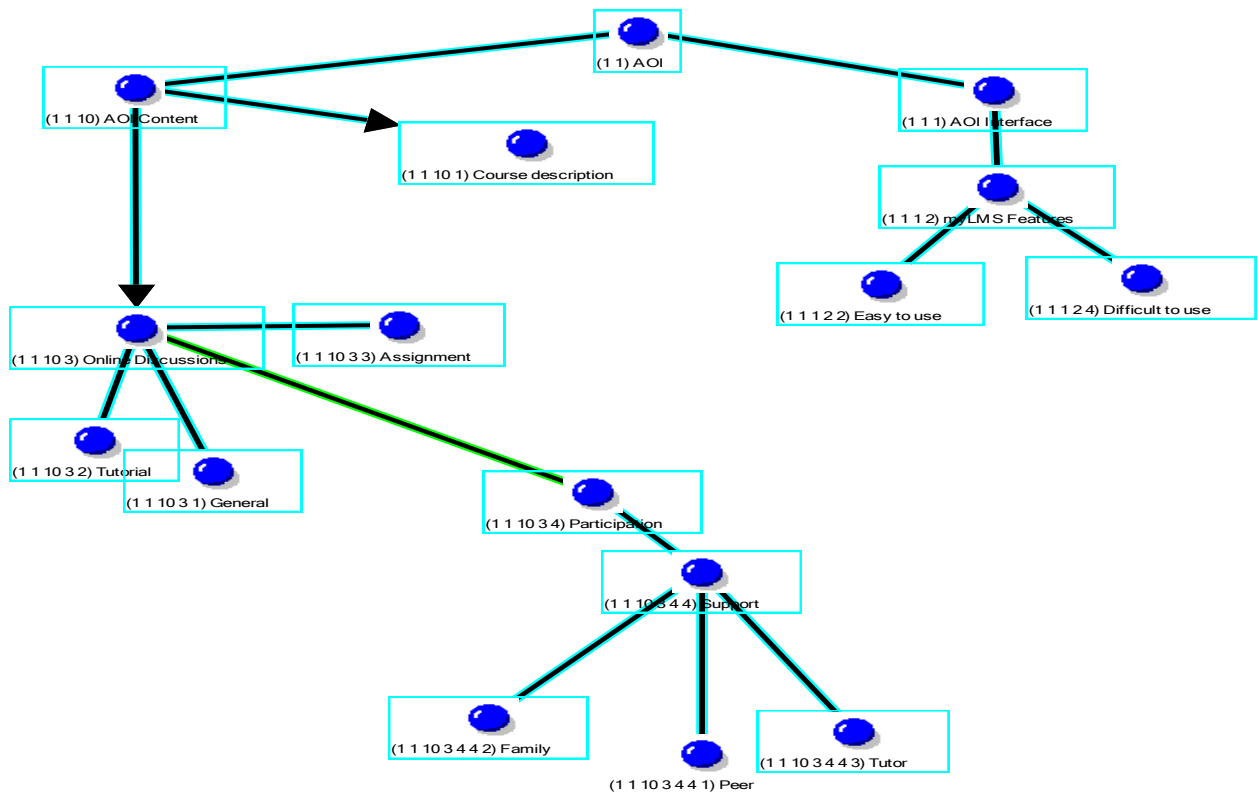


Figure 5 A sample chart produced using Model Explorer.

Conclusion

This paper has shown an example that case study is yet another qualitative research method that can employ NVivo in its data analysis. As stated earlier, the software program is incapable of doing any reading and thinking for a researcher. Therefore, good qualitative analysis relies on good analytical work carefully done by a human researcher. However, the researchers believe that if a researcher follows and employs the six strategies discussed in this paper i.e. working with data, organising data, breaking data into manageable units, synthesizing data, searching for patterns and

deciding what and how to tell others without fail he/she will be able to see successful completion of ones qualitative data analysis.

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Presenting Author's Biodata

Ranjit Kaur is currently pursuing her PhD studies at the Faculty of Education, University Kebangsaan Malaysia (UKM), Selangor, MALAYSIA. She is attached to the Institut Perguruan Bahasa Melayu Malaysia (IPBMM), a Teacher Training College in Kuala Lumpur. She has been attached to the Educational Technology Department for the last 10 years. Prior to this, she has also taught in secondary schools for 8 years. As an Educational Technology lecturer, she has conducted numerous related courses for in-service and pre-service teachers. Ranjit is also an author of Educational Technology and English Language Textbooks currently used in Malaysia. She is also actively involved in a number of research projects with the Ministry of Education, Malaysia. Her interests include integration of ICT related skills in teaching and learning, online learning and life-long learning.