The Partial Approach to Grounded Theory Integrated with Activity Theory: A Generic Framework, Illustrated by a Base Study in an e-Learning Context

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Abstract
Published studies frequently emphasize research situations and data collection methods at the expense of discussions of analysis (Eisenhardt 1989). This results in a gap between data and conclusions. Grounded Theory research, in particular, is prone to misconceptions and technical fixes that increase the gap. The principal objective of this meta-research study is to propose, articulate, and motivate an integrated generic research framework that combines elements of the Grounded Theory Method and Activity Theory in a Partial Grounded Theory approach. The integrated research design was synthesized during a base study on forum interactions in an e-learning context. Pertinent aspects of this qualitative base study are described to illustrate the framework, after which the full framework and its phases are presented.

Keywords: Grounded theory, partial grounded theory, activity theory, meta-research, mathematics education, e-learning, online discussions.

Introduction and Background
Grounded Theory originated with the seminal publication, 'The Discovery

of Grounded Theory' by Glaser and Strauss (1967). Grounded theory (GT) is a popular method for the collection and analysis of qualitative data in situations where there are few theoretical explanations regarding a topic. Using the Grounded Theory Method (GTM), conceptual properties and categories are either discovered or generated from qualitative data which leads to the development of new or emerging theory. It is claimed to be the most widely used qualitative research method in the social sciences (Locke 2001). A probable reason for its popularity is that it contains a number of guidelines and procedures, thereby providing a useful template that serves as a 'comfort factor' when conducting qualitative research (Hughes & Howcroft 2000).

Grounded Theory is traditionally aligned with objectivism, but has also been used in constructivist contexts (Mills, Bonner & Francis 2006). This change in stance led to different rules for conducting GT research, sparking a long-standing debate between the initial authors over the 'correct' method and strategies for collecting and analyzing data (see Glaser 1978, 1992) versus Strauss and Corbin (1990; 1998)). The major divergence relates to the methodological rather than ontological and epistemological aspects, with researchers typically choosing the approach they find most appropriate for their particular research and that provides them with a clearer picture of how to apply Grounded Theory contextually. These tactics have resulted in many 'technical fixes' to GTM over the years (Barbour 2001).

Whereas the original intended use of the GTM requires a longitudinal interplay between data gathering and analysis in a cyclic fashion, Parry (1998) notes that this approach is seldom implemented, with scientists loosely employing the term 'Grounded Theory' to indicate that theory was derived from data. Strauss and Corbin (1990) distinguish between a *Full Grounded Theory* approach, which is iterative, and a *Partial Approach*, whereby the data is simply theorized upon, not necessarily in an iterative manner. They furthermore state that there are two main shortfalls in the partial method that reduce its efficacy as sound scientific research. The first is the absence of an explainable analytical process by which concepts are built up to higher levels of abstraction. The second relates to failure to deter-mine (or at least, explain) the nature of relationships between categories or concepts. The result is that some GT methods fail to meet the precision and criteria for good scientific research (Strauss & Corbin 1990).

To circumvent these criticisms, Charmaz (2006), who is acknowledged as a leading theorist and exponent of GTM, recently repositioned Grounded Theory as a *flexible approach* and *not a strict methodology*, thereby inviting researchers from other standpoints to use it in innovative ways. Seaman (2008) elaborates on various ways in which traditional GTM can be extended to new directions by following different methodological guidelines, in particular, using the vantage point of Cultural-Historical Activity Theory as a test case. In exploring the use of GTM within another existing theoretical framework, namely Activity Theory, he addresses issues faced by many GT researchers starting from an existing theoretical stance, namely: how to determine an appropriate role for Grounded Theory, and how to adapt its methods and strategies in the light of different methodological guidelines, whilst yet maintaining its original intent (Seaman 2008).

Similarly, this article seeks to contribute to the repositioning of Grounded Theory from a methodology with positivist underpinnings to a partial and flexible approach for use within different theoretical frameworks. As with Seaman (2008), the framework of choice is Activity Theory (AT).

Objective

The principal objective of this meta-research study is to propose, articulate, and motivate an *integrated research framework* that combines Activity Theory and the Partial Grounded Theory Method. In articulating the steps of the methodology, this paper addresses Strauss and Corbin's (1990) shortfalls of the partial method, i.e. the absence of an explainable analytic process and/or the failure to determine the nature of relationships between categories/concepts. We illustrate use of the framework by describing a recent study by van der Merwe and van der Merwe (2008), relating to use of an online discussion forum by two distinct groups of mathematics teachers. This study is referred to as the base study and the integrated phase-by-phase framework was initially generated to meet its particular requirements. The objective of the base study was to gain a deep understanding of the data from two case studies within specific contexts, through the application of selected and adapted Grounded Theory techniques, illuminated by Activity Theory.

The article explains the essential foundations of the theories and methods applied, highlighting the techniques and procedures that were adopted and adapted for the researchers' purposes. This is a similar effort to that of Locke (2001:95) to 'capture the complexities of the context in which the action unfolded ...'. Furthermore, we overview and present examples that illustrate the analytical processes. The purpose of this present article is to explicate and advocate this innovative research approach.

First, a review is provided of the essential foundations of Grounded Theory and Activity Theory. A research method is a strategy of inquiry that moves from the underlying philosophical assumptions to research design and data collection (Myers 2007). To this end, we then overview the base study, explaining the selection of its research methods and philosophical perspective, followed by an outlining of the data collection and analytical processes. Finally, the article consolidates the approach and its contributions by suggesting a generic integrated framework that can be applied by researchers in other contexts. The reason for presenting the base study prior to the introduction of the framework is to lead the reader toward the main proposal of this study by using an example.

Grounded Theory

Grounded Theory was outlined in the Introduction and is elaborated in this section. The defining characteristic is its use to generate substantive as well as formal theories through induction from data and comparative analysis, either by well-codified sets of properties or in running theoretical discussions (Glaser & Strauss 1967). Martin and Turner (1986:141) define GT as an 'inductive theory-discovery methodology that allows the researcher to develop a theoretical account of general features of the topic, while simultaneously grounding the account in empirical observations of data'.

There are two key beliefs in the classic GT of Glaser and Strauss:

1. Initially, no theory exists to be proven, disproved or extended, and
2. Grounded Theory is discovered through constant comparison between incidents and properties of a category.

GT is thus appropriate when little is known about a topic and where there are few existing theories to explain a phenomenon (Hutchinson 1988).

Babchuck (1997) identified research that employed the GTM in educational environments, including studies on: teacher burn-out and stress (Blase 1982); middle school students' perceptions of factors facilitating the learning of science (Spector & Gibson 1991); adaptive strategies of expert teachers (Conrad 1987); life in an adult basic education classroom (Courtney, Jha & Babchuk 1994); group socialization of secondary school teachers (Gehrke 1982); and instructional innovation in higher education (Kozma 1985). Other GMT research identified by the primary author of the present article includes: attitudes, needs and professional development of science teachers (Klieger, Ben-Hur & Bar-Yossef 2009); web-based learning environments (Zimmerman, 2002); academic change (Conrad 1978); and self-efficacy beliefs in academic settings (Pajares 1996).

The GT-method is also well suited to IS-research (de Villiers 2005). Some of the more prominent studies advocating a GT methodology in IS include Orlikowski (1993), Walsham (1995), Fitzgerald (1997), Hughes *et al.* (2003) and Hansen *et al.* (2005).

One of the major criticisms of studies employing the GTM relates to the lack of actual theory generation. For example, Locke (1996) criticizes an 'anything goes' approach by some researchers; Bryman and Burgess (1994) express concern about the use of Grounded Theory as 'an approving bumper sticker' to imply academic respectability in the absence of a helpful description of the analysis strategy used; Melia (1997) suggests that most researchers use a pragmatic approach in an effort to achieve 'added value' by identifying new themes from the data alongside those that could have been anticipated from the outset; and Barbour (2001) charges that in the absence of analytical, in-depth analysis, many researchers produce 'artificially neat and tidy' descriptive accounts. The result is that many papers claim to be Grounded Theory when they do not give full attention to the systematic yet flexible procedures it offers, or fail to offer or elaborate on the exact procedures employed.

The four core GTM steps used in the analysis of data are open coding, axial coding, selective coding, and theoretical sampling until theoretical saturation is reached.

Open Coding

The three basic elements of the GTM are concepts, categories and propositions (Pandit 1996). Incidents or activities are analysed as potential indicators of phenomena and are given *conceptual* labels in order to accumulate basic units for theory generation. *Categories* are higher level abstractions of these concepts and provide the means whereby theory can be integrated. *Propositions* indicate general relationships between a category and its concepts, and between discrete categories. GT frequently involves analysis of texts, systematically searching for terms, statements and phrases in the content and classifying them with explanatory labels (Hansen *et al.* 2005), so as to identify, name, categorize and describe phenomena (Glaser *et al.* 1967).

Theoretical sensitivity, a cornerstone of GT, is defined by Glaser (1978) as the personal insight with which a researcher approaches a research situation. Such insight should be conceptual rather than concrete. It represents the creative aspect of the GTM, and through such theoretical sensitivity, the researcher becomes able to recognise important data, and to filter it from the particular to the more general or abstract. Recognizing and continually challenging his or her personal theories and biases against the data (known as GT's constant comparison method) provides a way to consolidate, but also to manage, theoretical sensitivity.

Open coding employs theoretical sensitivity and is hermeneutic, i.e. an interpretive act by the researcher. During initial analytical reading, first-attempt labels are assigned to sections of text. The process of constant comparison and re-reading results in certain labels being renamed, others being refined, and 'in-vivo' re-structuring whereby duplicates are eliminated and text fragments with the same meaning are assigned the same label. Such thematic analysis involves the search for, and identification of, common threads that extend throughout the data.

Axial Coding

The purpose of axial coding is a further pass through the data to discover categories into which the concepts can be classified, i.e. the data is reconstructed in different ways. The meanings behind concepts and categories are then compared in order to explain the material and relationships between concepts (Hansen *et al.* 2005). Axial coding is a

cornerstone of Strauss and Corbin's (1998) approach, but is regarded by Charmaz (2006) as highly structured and optional. The ability to perceive variables and relationships is also part of the researcher's theoretical sensitivity and can be enhanced by the use of appropriate techniques (Strauss *et al.* 1990), including automated tools for qualitative analysis.

In iterative comparison, it may be necessary to shuttle between open and axial coding and to move between levels of abstraction to make adjustments. This ensures that important data is not unintentionally discarded, and also assists in making sense of the data. Glaser and Strauss (1977) warn that meaningless data should not be fitted to concepts or categories, but should be disqualified.

Selective Coding

Selective coding is the process of choosing one category as the core category, and relating all other categories to it (Strauss *et al.* 1990). This category is intended to act as a guide for further data collection and analysis in order to build the theoretical framework (Glaser, 1978). The essential idea is to develop a single storyline around which all else is draped. Such a core category almost always exists (Strauss *et al.* 1990) and is typically identified as the category that is mentioned with highest frequency and is well connected to other categories. In a full GTM, one would typically cease coding text that does not relate to the core category and would collect more data on it, as well as on its connected categories and properties en route to building a theory.

Theoretical Sampling

Theoretical sampling is the process of literal and theoretical replication. New cases are selected and the process is repeated until theoretical saturation occurs. The purpose is to confirm, extend and sharpen the theoretical framework (Yin 1994). The process ends when improvements are marginal.

Activity Theory

Activity Theory (Vygotsky 1978; Leontjev 1978, 1981; Engeström 1987; Cole & Engeström 1994) is a particularly suitable theoretical framework

when context is central to the research. Kuutti (1995) discusses the potential of AT for research into human-computer interaction (HCI), proposing it as a framework for HCI research and design. In AT, the basic unit of analysis is human activity (work). In simple terms, an activity is defined as the engagement of a subject toward a certain goal or objective. An activity is undertaken by a human agent (subject) who is motivated toward the solution of a problem or purpose (object), and mediated by tools (artifacts) in collaboration (roles) with others (community). The structure of the activity is constrained by contextual cultural factors including conventions (rules) and social strata (division of labour) (Ryder 1999).

Each activity performed by the subject is analyzed as part of the collective Activity System and within the social-cultural context of both the individual and the collective. In order to make sense of the system, a shared understanding is required of: the character and history of the subject; the object that the individual is trying to attain; characteristics of the community; and the tools available to the subject. In the process of the object changing, all the other components adopt new perspectives, and a new Activity System is born. The components of such systems are not static components existing in isolation. They interact reciprocally and, in this way, are reciprocally constituted through mutual interactions within the Activity System. Figure 1 shows this tri-stratal representation of social activity.

An examination of any phenomenon must consider the dynamics between its components. Data analysis should therefore be conducted within the context of the tri-stratal framework to ensure understanding of the activities, actions and operations performed by the subjects, and reveal their motives, goals and instrumental conditions.

It is important to note that AT is a broad conceptual framework and not a theory in the strict sense. It consists of a set of basic principles which constitute a general conceptual system that can be integrated with more specific theories, such as GT. One of Engeström's (1987) original motivations for using GT was to allow researchers to identify the inner contradictions that impose tensions and instability on participants' settings and help them change the nature of an activity to overcome those tensions. The identification of tensions provides an indication of the stability or instability of the Activity System. If there are no tensions, there are no contradictions and the nature of an activity need not change.

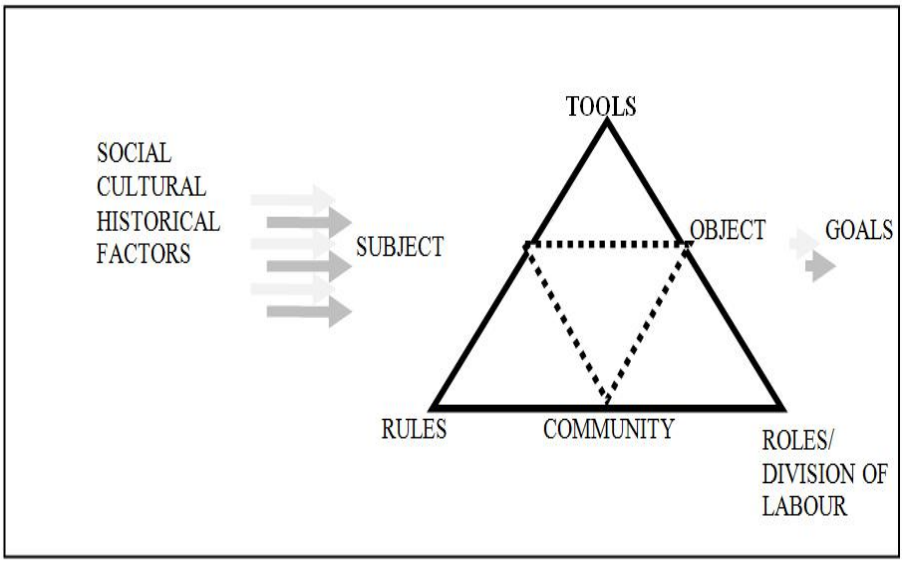

Figure 1: The tri-stratal framework of Activity Theory (Ryder 1999)

Having introduced the essential foundations, we now focus on reconstructing how we arrived at the exact analytic processes followed in the base study, with specific reference to our adapted GTM steps and the use of AT to determine the nature of relationships between categories/ concepts.

Overview of the Base Study

Purpose and Context

In reconceptualising Continuous Professional Development (CPD) for school teachers, Smiley and Conyers (1991), call for a paradigm shift from learning separately and learning through replication (static learning) to learning together and practicing (interactive learning). Teachers are often isolated from peers in their discipline, whereas they could benefit from mutual engagement in inquiry and reflection (Barnett 1998; Clandinin & Connely 1995; Stein, Smith & Silver 1999). Interactive communication with colleagues and the exchange of knowledge and ideas is the conceptual backbone of this paradigm shift, and one very common research route focuses on the use of online discussion forums to create virtual communities of practice.

The van der Merwe *et al.* (2008) study aimed to discover personal and situational factors (or *tensions*) that impact on the value and practical use of a mathematics-friendly online discussion forum environment (ODEM) as a reflective tool in pursuit of the CPD of Grade 5-7 mathematics teachers in the South African context of disparities. Participating teachers came from both a (previously) disadvantaged group and a (previously) advantaged group. The primary foci of this base study were to discover tensions that occurred and impacted on the use of the ODEM in the CPD educational process of the two different sub-communities, and to understand the differences (if any) between the groups. Findings would serve to ensure that future on-line CPD strategies are more directed and purposeful. The base study therefore lies in the *application area of mathematics education*, with a *focus area of e-learning*, due to the use of an online discussion forum as a communication tool.

To support the study, personal computers (PC's) and home Internet connections were provided to both groups of disadvantaged and advantaged teachers. The selected teachers were already active participants in cluster meetings, and therefore intrinsically motivated towards CPD opportunities. Twenty teachers (ten from each group) were tasked to visit the ODEM on a regular basis and to reflect and share on their classroom practises within separate discussion forums, thereby providing opportunities for collegial interaction and the exchange of knowledge and ideas. Prior to this venture, few teachers and schools – particularly from disadvantaged communities – owned or had access to PC's and the Internet. The cost associated with the provision of hardware and access necessitated small samples, which also hindered replication of datasets and use of the full GTM.

Of the twenty teachers, only sixteen were successfully connected and able to participate. In order to effect a meaningful investigation, a fitting research design and associated methodology was required. The research approach, which was based on particular philosophical stances, dictated the design and methodology adopted. These are outlined in the next section.

Philosophical Perspective

It was clear from the outset that context was important. The focus of the research was on human activities within the context-specific settings of advantaged and disadvantaged communities, and how these actions were

influenced by their settings. Human activity should be studied in its real-life situation (Marshall & Rossman 2006), and the study therefore adopted the *qualitative* research paradigm.

Since the study aimed to understand the context of implementation of a computing system and the processes whereby its use and value were influenced by said context, an *interpretive perspective* was selected as the philosophical foundation. The philosophical basis of interpretive research is hermeneutics and phenomenology (Boland 1985), which neatly tied the selected philosophical approach to the qualitative ethos of the study.

The next chronological decision was the selection of appropriate research method(s) to employ.

Research Design and Methods

Following on the preceding theoretical overviews of Grounded Theory and Activity Theory, this section outlines their application in the base study. The actual implementation and adaptation of the techniques is addressed in more detail in the section on data collection and analysis.

Various qualitative and interpretive research methods were investigated, using a framework proposed by Van der Merwe (not the present author), Kotze and Cronje (2005), which matches the research questions of a study against the key elements of qualitative research paradigms. In the case of the base study, these questions related to identifying tensions in each group of participants and contrasting these differences. The study was found to fall within the ambit of Grounded Theory- (GT), Activity Theory- (AT), or Case Study methods and it was decided to use aspects of all three. The next subsection describe the role of AT and a partial GT approach (Strauss & Corbin 1990), as applied to the particular cases in the base study.

Case studies involve examination of specific phenomena (such as programmes, events, processes, institutions or groups) in their real-world contexts, by presenting detailed information about the phenomena, frequently including accounts by the subject/s themselves (Merriam 1988; Yin 1984; 1988). Tellis (1997) advocates that the researcher should personally work with the situation in each case. In the base study, there were two distinct types of case, polar types, presented by the advantaged and disadvantaged groups, respectively, with sampling-logic rather than

replication defining the cases. The study followed Yin's (2002) interpretive, revelatory single-case approach in each of the two distinct communities. To identify the tensions in each, a detailed within-case, write-up approach was followed, in order to become 'intimately familiar with each case as a stand-alone entity' (Eisenhardt 1989:540) before generalization of patterns could occur across the two cases.

Grounded Theory and Activity Theory, as Used in the Base Study

Previous sections introduced essential foundations of GTM and AT. This section describes their joint use in the context of the cases in the base study. We have mentioned applications of GT in educational research, and a strong motive for pursuing GTM in this study is its suitability for research in adult education which, according to Babchuk (1996), is characterized by a strong commitment to the real world of practice but lacks well-developed theoretical foundations. Furthermore, Preece, Rogers and Sharpe (2007 citing Sarker 2001), describe the application of GT as a research approach for analysing an interactive discussion forum

The selection of a single repeated-case approach in two distinct communities offered little potential for theory building. As Eisenhardt (1989) posits, with fewer than four cases, the empirical grounding is likely to be unconvincing – unless a case contains several subcases, which may offer an even deeper understanding of processes and outcomes and a sound picture of locally grounded causality (Miles & Hubermann 1994). In order to arrive at convincing theoretical concepts, the identification of embedded subcases was a necessary objective. This is elaborated in the data analysis section, where it is shown how Activity Systems were used to define contextual units of analysis (or Activity Systems) in the base study.

The base study centred on the properties of units – where the units were: a disadvantaged group; an advantaged group; the tensions within each group as it uses the ODEM; and the value they obtain from the ODEM. As Glaser (1978) points out, *properties of a unit* are more relevant to descriptive qualitative studies, while *properties of a process* are more relevant to studies aiming at theoretical conceptualization. This meant that the GT-method used here, is similar to that in Chow's (1998) qualitative descriptive study, which had GT overtones by its employment of GT-techniques but without theory generation.

The use of selected GT techniques only, thus seemed an appropriate choice for investigating and analysing data. In particular, Strauss and Corbin's (1990) 'partial' GMT approach is relevant, whereby emerging theory is not induced in an iterative manner. Although Strauss and Corbin (1990) acknowledge shortfalls in the partial approach, this paper suggests ways of using the GTM in line with Charmaz's (2006) flexible, rather than strict methodological, approach.

Barab, Schatz and Scheckler (2004) make the point that, while it is common for educational-technology researchers to publish studies reporting the nature of systems in terms of a unitary, coherent, and refined entity, the same researchers fail to portray and acknowledge the complex human and other dynamics that characterise the development and usage of a system. In their classic work on qualitative data analysis, Miles and Huberman (1994) suggest that the methods they present should not be applied scrupulously. Instead, the creation, testing and revision of simple, practical and effective analysis methods remain the highest priority for qualitative researchers.

Mindful of the criticism levelled at partial GT-methods and the limitations of single case study designs, it was necessary to maximise the context-analytic possibilities inherent in the base study and to do so by *data triangulation*, which means using different sources of data.

In concurring with these viewpoints, the study applied selected techniques of both partial GTM and AT in a case study context, but structured and adapted to effect credible results. A further way in which theoretical credibility can be achieved, is through interactions between elements of GT and AT, leading to *theoretical triangulation*, which, in its simplest terms, means analyzing the same set of data from multiple perspectives. Annels (2006) notes that different research approaches can be creatively and successfully used in one study if there has been adequate consideration of vital factors that determine whether there is a good 'fit' of the approaches, not only with the research problems and questions, but also with each other, while maintaining the integrity of techniques. The use in this study of Activity Theory within a partial GT methodology attempts not only to address shortcomings, but also to fill gaps created by the use of selected GT-techniques only.

Finally, Thorne, Reimer Kirkham and O'Flynn-Magee (2004) describe *interpretive description* as a coherent conceptual description that taps thematic patterns and commonalities which characterize the

phenomenon under investigation and that also accounts for the inevitable individual variations. This description accurately fits the research focus of the base study. The base study thus adopted a *revelatory, interpretive and descriptive* approach to the two single cases under investigation. The next section summarizes the data collection phase, followed by a detailed report of the exact analytical processes followed.

Data Collection and Analysis

Having motivated the methods selected and adapted, the subsections on data collection and data analysis provide a walk-through of how the methods were used, thereby presenting a situated introduction to the framework presented at the end of this paper.

Data Collection

Data was collected from semi-structured interviews, forum posts, server logs, teacher journals, the primary author's own research journal and a focus questionnaire, thereby providing multiple perspectives and ensuring triangulation of data (Glaser *et al.* 1967; Orlikowski 1993; Pandit 1996).

Primary data sources in the first phase of analysis were interview data and journals kept by teachers and the researcher. Forum posts and server-logs data were used to confirm or deny concepts and tensions discovered. GTM-type memos were kept throughout the analysis, as subsequent data collection.

Parry (1998) advises the use of computer software to maintain and analyse data in scientific grounded theory research. With the exception of server logs, all the data was transcribed and fed into the *Atlas-ti* software package, which is a powerful workbench for qualitative analysis of large bodies of textual data (see http://www.atlasti.com). It contains tools for accomplishing various tasks associated with systematic approaches to 'soft data'. After hermeneutic units had been created, including all the data from the two groups, respectively, formal data analysis commenced.

Open Coding

In order to indentify emerging concepts from the data, the GT technique of open coding was employed. Within the *Atlas-ti* environment, the transcribed

texts were analysed manually, line by line, searching for different words in the statements and classifying part-statements with labels to explain the meanings of the different parts (Hansen *et al.* 2005). This process was concerned with identifying, naming, categorizing and describing phenomena in the text (Glaser *et al.* 1967). As in all GTM research, the research results were emergent that is no preconceived theory existed about possible tensions. An open strategy (Creswell 1998) was followed. During initial reading, first-attempt labels were assigned to sections of text. In a process of constant comparison, texts were re-read several times, leading to re-naming of some labels, refinement of others, and assignment of the same label to texts that had very similar meanings.

Cole and Knowles (2001) posit that the analytical process required in contextual research is not one of dissection but one of immersion, rationality and intuition. They suggest that: 'We become surrounded and washed by the material, we bathe in it, live it, and breathe it. Like getting to know a good friend, because we have spent so much time together and come to know so much about her, eventually we begin to think, just a little, like her' (Cole & Knowles 2001:106).

This accurately portrayed the base study, as concepts or themes rose to the surface from deep inside the data (Neuman 2003). For example, it became apparent that some of the labels could be categorized into a concept termed 'Township-[1]related problems'. This related to the unique kind of problems experienced by disadvantaged teachers as a direct consequence of the crowded township environment they work and live in, and which in instances negatively impacted on their participation in the ODEM.

On completion of the open coding phase, focused questionnaires were used to confirm certain themes that emerged and to supplement incomplete information. Several concepts were discovered in this manner, initiating the next step in data analysis – the GTM-technique of axial coding.

[1] Townships are sub-urban residential areas established in the apartheid area on the periphery of white towns and cities – close enough to work in white areas but distant enough to ensure separate development.

Axial Coding

In a further pass through the data, categories were discovered and concepts were classified. This supported the researcher in better understanding the information and identifying relationships between concepts.

The *Network View Manager* in *Atlas-ti* was used to develop preliminary categories by grouping concepts with similar meanings. Once again, the researcher's theoretical sensitivity was employed. Figure 2 combines three screenshots from the Network View Manager that visually represent the open and axial coding processes of the disadvantaged group at a certain stage.

The text segment marked **A** comprises two lines of text from a transcribed interview. It was initially labelled differently, but was renamed 'township problems' when a concept termed 'problems related to township life' emerged from the data.

B represents a screenshot of an extract from a drop-down list containing links to all the transcribed text that was related to the concept 'township problems'. **C** shows this concept, 'Township problems', grouped along with several other concepts such as 'no study', 'transport problems', 'busy family life', etc. These were placed in a category called 'Preventative issues' (**D)**, to contain issues that hindered teachers from optimal participation in the ODEM. Moving from **A** through to **D** therefore presents increasingly abstract representations of the data collected. Several other categories were discovered in this way. **E** shows a screen shot of the 'Positive participation effects' category and its concepts.

Grounded theorists seldom return to earlier text to code newly discovered categories. However, in the process of discovering new categories, the researcher became more sensitized to the emerging view, and revisited the original data regularly to check whether the initial coding was too narrow or too broad. Glaser and Strauss (1977) caution that meaningless data should not be refitted to concepts or categories, but should be disqualified. In this manner, from a total of 870 codes initially generated for the two cases together, 441 were used and the rest discarded.

Atlas-ti's *Network Manager* simplifies forwards-and-backwards mobility between various levels of abstraction to make adjustments where necessary. For example, clicking on any concept **C** opens the associated drop-down list **B**, and clicking any of the text lines in **B** transports one directly to the original transcribed and labelled text **A**. Such constant shutt-

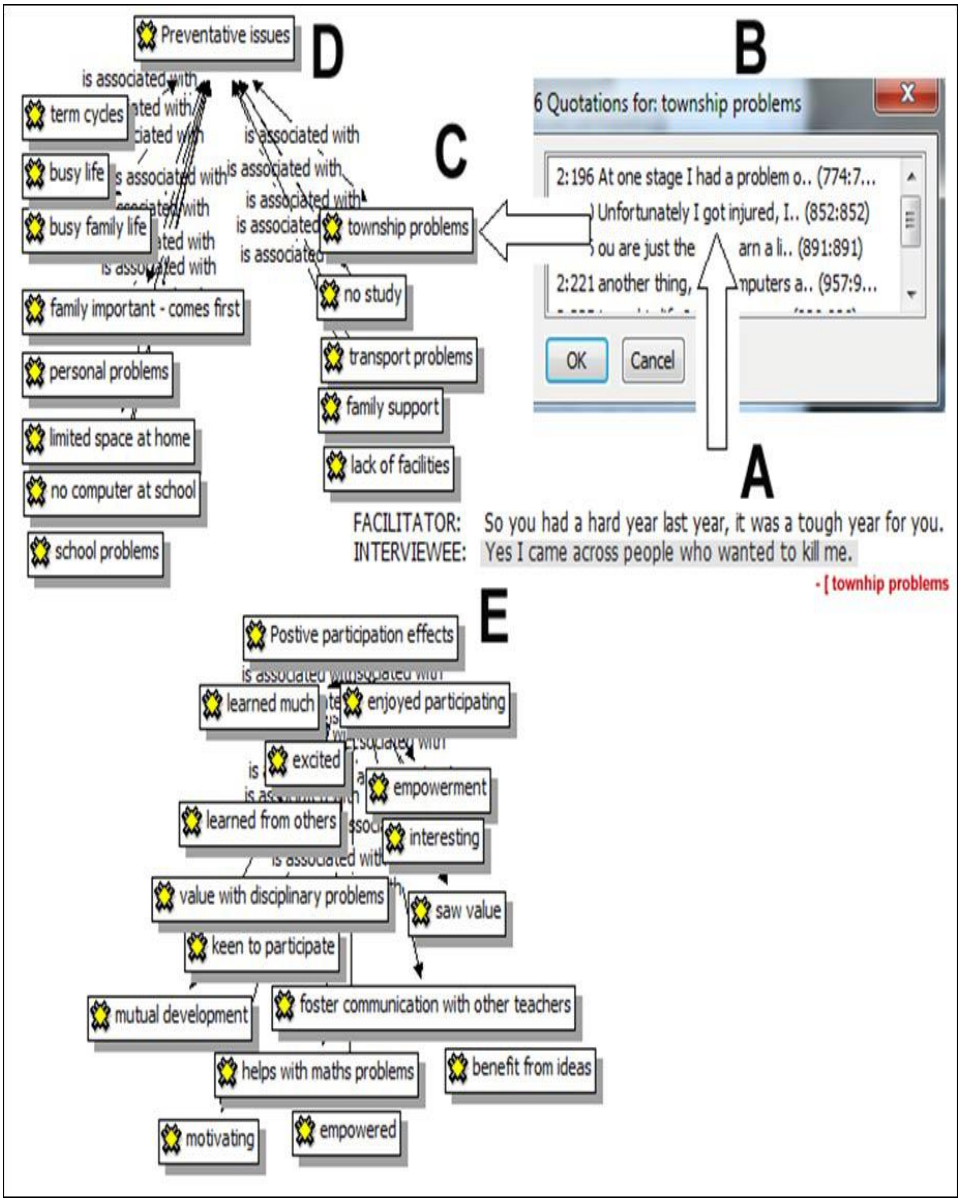

Figure 2: Open- and axial-coding: Atlas-ti Network View Manager Snapshots

ling between open and axial coding ensures that important data is not unintentionally discarded, and also assists in making sense of the data. For example, the text, 'Yes, I came across people who wanted to kill me' in **A** should not be viewed in isolation from the preceding or following text in the hermeneutic unit. The respondent simply meant that some bad guys were after him – not necessarily to kill him. The shuttling process is time consuming but, as the foundation of data analysis, it cannot be otherwise.

Selective Coding

The next chronological step in GTM is selective coding, in which a single category is chosen as the core category, and all other categories are related to it (Strauss *et al.* 1990). At this point, researchers would cease coding text that does not relate to the core. For the purpose of theory building, they would collect more data on the core, as well as on its related categories and properties. Due to the Partial GT approach and the single cases in the base study, this was not possible and, at this point, we moved towards Activity Theory. Rather than choosing one category as the core category, the technique of selective coding was adapted by forming new 'super-categories' to serve as containers (or classes) for related categories. Table 1 provides a condensed view of the disadvantaged group classes (underlined in the table) and their related categories, as they emerged from the open, axial and adapted selective coding processes.

The class Connecting to the ODEM was created from categories related to the provision of and access to an Internet-ready computer, as well as the ability to successfully connect to the ODEM in order to participate[2]. The class Using the ODEM was created from categories that are self-descriptive, such as Preventative factors, Negative participation effects, Motivation for participation, and so forth[3]. Some category concepts fitted in both these classes, and were thus placed in a Shared class. The Asked class existed because of specific questions that were posed during the semi-structured interviews and the focus questionnaire.

[2] For various reasons, the disadvantaged teachers experienced a variety of problems in connecting to the Internet and the ODEM.

[3] These impacted on the use of the ODEM by teachers

Table 1: Category and Class view of disadvantaged data

CLASSES	CATEGORIES
Connecting to the ODEM	Connecting to ODEM (8:23)
Shared	Support required (5:19) Financial factors (3:13
Using the ODEM	Preventative factors (11:46) Negative participation effects (9:25) Positive participation effects 14:(36) Suggestions (11:13) Training (4:17) Value of ODEM (5:25) Personal characteristics (7:15) Ease of use (7:15) Other use of PC than for ODEM (3:11) Motivation for participation (4:5)
Asked	Point of access 4:7) ODEM vs. Cluster (3:10) Subject Advisor required (9:16) Content vs. reflection (7:11) PC literacy (7:25) Cross-cultural (3:*7)*

Key: Figures in brackets (the number of concepts associated with the category: total number of codes associated with the concepts in that category)

For example, teachers were asked whether they preferred access to the ODEM from home or from school. The category *Point of Access* was in fact not discovered during open coding, but was nevertheless labelled to assist the interpretation phase. The classes identified can be viewed as subcases. Two classes are explicit: Connecting to the ODEM and Using the ODEM. The Shared and Asked classes, in this instance, provide supporting evidence.

The shift away from the pure GT technique of selective coding is significant in the context of this paper, since it firmly positions the research

approach as a Partial GTM. In the next sections, some shortfalls of the partial GTM are addressed, namely the: (i) absence of an explainable analytic process by which concepts are built up to higher levels of abstraction, and (ii) the failure to determine the nature of relationships between categories/concepts.

As a starting point, the two explicit classes identified in Table 4 can be viewed as subcases, or, from an Activity Theory perspective, 'Activity Systems'.

Subcases as Activity Systems

Figure 3 represents a specific instance of the generic diagram in Figure 1. It graphically depicts the subcase Connecting to the ODEM for the Disadvantaged group as an *Activity System.*

Consider the act of a teacher wanting to participate in the ODEM. Connecting to the ODEM via the Internet can be considered an Activity System, where the *subject* is a mathematics teacher; the *object* is an Internet connection with the goal of participation in the ODEM; and the *community* is disadvantaged. The *tool* is an Internet-ready personal computer; *rules* are that teachers must connect to the Internet and visit their respective forums to reflect on their practise and respond to other teachers' reflections. The *roles* may be the telephone provider who should supply a clear and working telephone line; an Internet Service Provider to ensure Internet access; the researcher who must prepare Internet-ready computers, transfer funds for Internet-connection fees to teachers' bank accounts, and provide support and training on the ODEM; the teacher who must pay connection fees and who must perform the activities defined in the *rules*. If the object is connecting to the ODEM but the Internet connection fees were not paid, no connection is possible and the object of the Activity System then becomes paying the fees, with the subsequent goal of a successful connection. In the process of the object changing, all the other components adopt new perspectives, allowing analysis in context.

Accordingly, two Activity Systems existed:

- Disadvantaged Activity System 1 (**DAS1**): Connecting to the ODEM; and
- Disadvantaged Activity System 2 (**DAS2**): Using the ODEM.

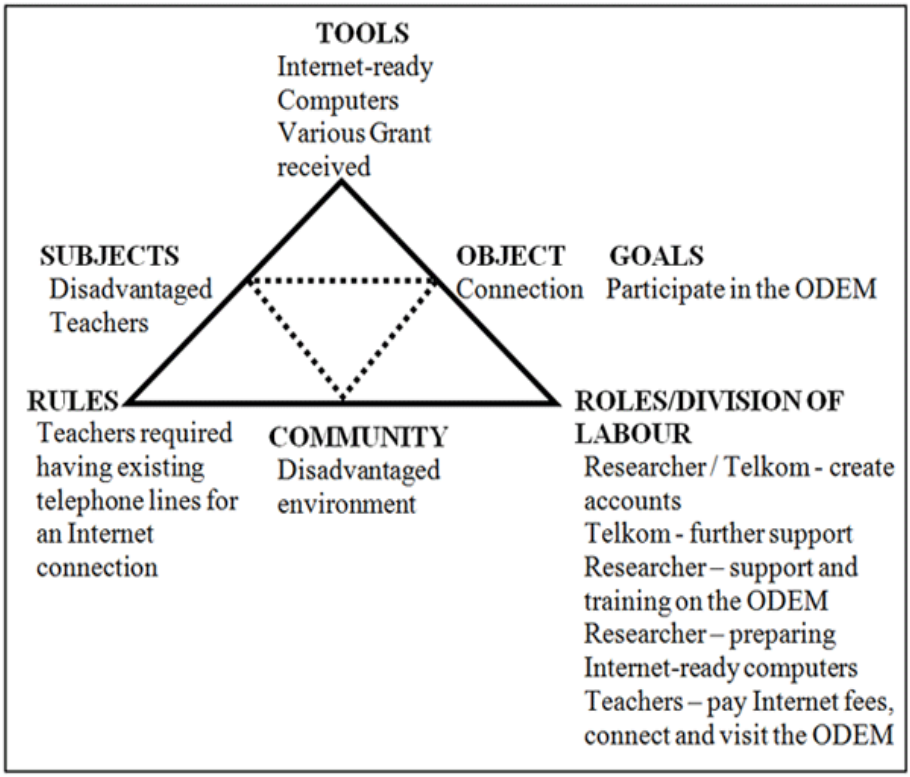

Figure 3: The class <u>Connecting to the ODEM</u> represented as an Activity System

Further analysis took place within each Activity System – ensuring context and understanding of the activities, actions and operations performed by the subjects, revealing their motives, goals and instrumental conditions. *How* further analysis was done was achieved through a process which can be called 'Decomposition of Activity Systems phase'.

Decomposition of Activity Systems Phase

Decomposition, also not part of conventional GTM, occurred within the Activity Theory framework of *subjects, rules, community, division of labour* and the *objects* and *goals* by way of a chronological report in narrative format.

As a first step, the collected (transcribed and not-transcribed, suchas server logs) data was interpreted by identifying and describing the Activity System's components and possible tensions that existed in and between components. It required going back to the original transcribed text via the Activity System and its identified categories and concepts, using the demonstrated functionality of *Atlas-ti Network Manager*. This process is particularly suited to a storyline approach, where all the original data is put back together again in thick, rich descriptions that explicate the conceptual journey followed.

To illustrate this process, it is appropriate to present an example. Consider the following two (compacted) rich descriptions. They relate to the *community*, but supported a *subject* tension labelled **T3|DAS2**: *Lack of Fervour* (or Tension 3 in Disadvantaged Activity System 2, to indicate teachers' lack of enthusiasm, eagerness and commitment, which impacted on the depth and level of their forum contributions):

> The townships schools are very difficult and you find that there are people who ... during breaks and during the lessons ... are selling these drugs to the learners. Most of the learners are coming late, especially for the first periods .... the problem which causes this I think is the government, because the government officials used to stand in front of the national TV and tell the learners there is nothing the teacher can do to you. So even if the siren is ringing ... they are just strolling.
>
> **Teacher 4**

> Then the other issue that I am afraid that needs to be addressed is the morale of the teachers, it's very, very low, they don't feel good they feel they are more or less powerless. In terms of discipline there is a big void that has come in between the learner and the teacher ... what is the boundary of the teacher? What is the boundary of the learner? Discipline is the problem. It's not the content itself.
>
> **Teacher 1**

Content analysis and classification of postings on the forum, shown in Table 2(a) also lend themselves to rich qualitative study and the development of themes and patterns, which is strongly in line with GT. This

is also the case with initiation and response tallies (another data source), illustrated by Table 2(b).

Relationships discovered in the qualitative data were strengthened by the parallel use of such data. For example, the tension **T3|DAS2**: *Lack of Fervour* is strengthened with evidence from Tables 2(a) and 2(b), while another tension, **T4|DAS2**: *Lack of Reflective Practises* was partially confirmed with the evidence from Table 2(a).

Decomposition was a revelatory process. As each additional category was decomposed, more insight was gained into previously decomposed categories. In this process, the author also made extensive use of the GT-technique of memo writing (on ideas that formed when processing the data). These memos became data for subsequent phases.

These insights, in turn, forced regular revisits to the raw data in order to confirm and/or expand the evolving perceptions. Throughout the decomposition phase, tensions emerged which either explained or exaggerated previous tensions. The process ended when saturation was achieved, i.e. when all the apparent tensions within the data had been identified.

In the pure GTM, a basic theoretical framework would have existed at this stage, to be followed by theoretical sampling, with the purpose of confirming, extending and sharpening the theoretical framework. In that activity, there is literal and theoretical replication of the cases until theoretical saturation is reached. Given that this study had no explicit intention to develop grounded theory, these GTM activities were replaced by an interpretation phase using various perspectives, or data views.

Table 2(a): Nature of posts by classification

Nature of post	Number of	Total	Percent
Question – for clarification	6	29	26%
Question – for support	18		
Question – for a solution	5		
Response – agreeing	6	49	43%
Response – affirming	8		
Response – offering	28		
Response – correcting	6		

Response – no solution	1		
Positive statement	10	12	11%
Negative statement	2		
ODEM support	3	3	3%
Descriptive reflection	4	20	18%
Dialogic reflection	11		
Critical reflection	5		
Totals	113	113	100%

Table 2(b): Post and response patterns

Participant	Started thread	Own thread reply	Response to other	Total posts
Teacher1	4	3	16	23
Teacher2	0	0	2	2
Teacher3	4	1	2	7
Teacher4	2	1	4	7
Teacher5	1	1	21	23
Teacher6	3	0	7	10
Teacher7	8	1	5	14
Teacher8	0	0	0	0
Teacher9	0	0	1	1
Totals	**22**	**7**	**58**	**87**

Interpretation Phase

In the interpretation phase, the data and findings were reviewed from alternative perspectives. Cognisance was taken of the warning by Miles and Huberman (1994) that humans are not powerful processors of large amounts of information, and that they have a cognitive tendency to reduce complex information into selective and simplified configurations. The way in which information is displayed, plays an important role in the way it is extracted. Figure 4 shows their model representing interactions between data collection, reduction, display and conclusions.

This model proposes that, after data collection, the analyst should shuttle between reduction, display and drawing of conclusions, thereby preventing simplified and selective conclusions.

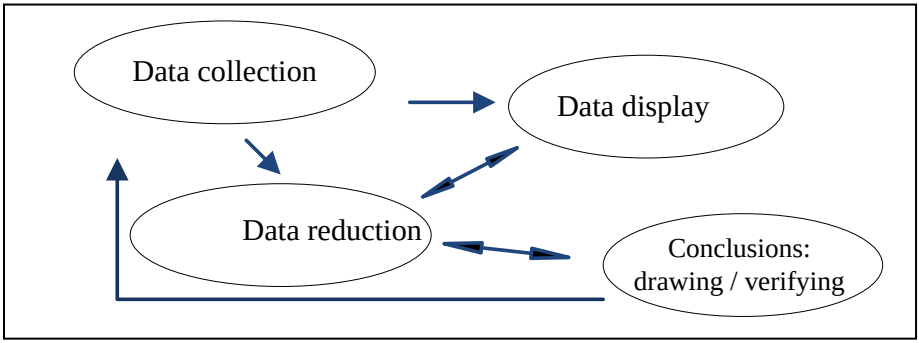

Figure 4: Components of Data Analysis: Interactive Model. (Miles and Huberman, 1994)

In Table 3 the columns relate to the base study's research questions (with some shared), and the rows to the Activity System components. This data view offered a refreshingly new perspective of the tensions in the disadvantaged group that had not been evident in the decomposition phase. Interpretation of this data view led to discovery of the core tension, **T12|DAS2**: *Leader required.* It was core in that if this tension could be resolved, then most of the other tensions would be resolved too. This step is notably similar to the GT-technique of selective coding, the difference being 'core tensions' in the base study, as opposed to 'core categories' in the GTM.

These processes were repeated for the advantaged group, whereafter comparisons were made between the two groups. The goal, as described by Eisenhardt (1989), is to become intimately familiar with each case as a stand-alone entity (in-case), which allows its unique patterns to emerge before attempting to generalize patterns across cases. Moreover, it gives investigators a rich familiarity with the data from each case which, in turn, accelerates cross-case comparison. If the processes described here, were repeated with another disadvantaged group, then the research would have leaned towards a full GT method.

Table 3: An Activity Theory and Research Questions Perspective of Disadvantaged Tensions

Activity System Components	ODEM-related tensions			Non-ODEM related tensions		
	Personal	Shared	Situational	Personal	Shared	Situational
Rules	**T3|DAS2**: *Lack of Fervour* **T4|DAS2**: *Lack of Reflective Practises* **T10|DAS2**: *Lack of Motivation*				**T11|DAS2**: *Point of Access*	
Subjects	**T1|DAS2**: *What to Post* **T8|DAS2**: *Quality of Participation* **T2|DAS2**: *Irregular Contributions*			**T6|DAS2**: *A Busy Life*		
Community					**T5|DAS2**: *Financial Factors*	**T7|DAS2**: *School/Township Related Issues*
Tools		**T9|DAS2**: *Training Required*	**T1|DAS1**: *Creating Internet Accounts* **T2|DAS1**: *Connection Problems*			
Division of labour			**T12|DAS2**: *Leader Required* **T3|DAS1**: *Lack of Suitable Support Structures*			

Table 4 provides a second data view example. It is based on Riel and Levin's (1990) schematic framework for describing network communities, which was also used to develop the interview questionnaire. This view isolated features that correlated with successful patterns of network interaction, in- and between-case.

Other frameworks were employed to create further views, allowing rich, contextual cross-case comparisons.

Table 4: Features and tensions comparison

Structure	Disadvantaged Group	Advantaged Group
Organization of Network		
Size of groups	9 teachers, 8 active participants	7 teachers, 5 active participants
Physical location of active teachers	7 teachers from Mamelodi Township (middle to lower class) 1 teacher from Ladium, an Indian community (higher to middle class) 1 teacher from Pretoria Central (middle to lower class)	3 from Pretoria East (higher class) 2 from Pretoria North (higher to middle class) 1 from Pretoria Southwest (higher to middle class)
Level of Education	7 Diplomas, 1 Degree	1 Diploma, 4 Degrees
Common experience	All active Cluster Meetings participants Grade 7-9 phase math teachers	All active Cluster Meetings participants Grade 7-9 phase math teachers
Level of PC/Internet Literacy	T9|DAS2: Training Required 1 literate 7 illiterate	4 literate 1 illiterate
Relationship to one another	Horizontal	Horizontal
Network Task Organization (Activity)	Reflect, exchange information, share ideas T4|DAS2: Lack of Reflective Practices T1|DAS2: What to Post T2|DAS2: Irregular Contributions	Reflect, exchange information, share ideas T2|AAS1: Lack of Reflective Practices T1|AAS1: Starting Threads

Response Opportunities	T1|DAS1: Creating Internet Accounts T6|DAS2: A Busy Life T2|DAS1: Connection Problems T3|DAS1: Lack of Suitable Support Structures T5|DAS2: Financial Factors T7|DAS2: School/Township Related Issues T11|DAS2: Point of Access	T3|AAS1: Slow Connections T4|AAS1: A busy life
Response Obligations	T8|DAS2: Quality of Participation T10|DAS2: Lack of Motivation T3|DAS2: Lack of Fervour T9|DAS2: Training Required	T5|AAS1: Quality of participation T7|AAS1: Substance required
Coordination and evaluation	T12|DAS2: Leader Required	T6|AAS1: Subject Advisor required

Literature Comparison Phase

In a full GT approach, an integral feature of theory building is comparison of the emergent concepts, theory, or hypotheses with the extant literature. This involves reflection on what it is similar to, what it contradicts, and why. A key to this process is to consider a broad range of literature only when the new theory begins to emerge and not beforehand (Glaser 1992; de Villiers 2005). In this manner the literature becomes an additional and equal source of data, as opposed to a constraint that may influence the coding and memoing processes.

In the base study, the intention of this phase was to locate, confirm and/or disconfirm the evidence in the light of relevant literature.

Outcome of the Base Study

The previous phases, combining selected aspects of Grounded Theory and Activity Theory and applied in the *particular context* of the base study, provided a theoretical foundation of constructs that supported the

development of a model to direct future online CPD-strategies for teachers (van der Merwe, van der Merwe & Venter 2010).

In the present study, it furthermore supports the generation of a substantive *generic conceptual framework* that can be applied to data collection and analysis in other research studies in the South African context of disparities.

A Framework to Integrate Partial Grounded Theory with Activity Theory

In the introduction section, two main criticisms of a Partial Grounded Theory were noted, namely: the absence of an explainable analytic process by which concepts are built up to higher levels of abstraction, and a failure to determine the nature of relationships between categories or concepts. We attempted to address these criticisms by way of a detailed explanation that moved from the underlying philosophical assumptions, through research design, then on to data collection, followed by data analysis and the process of constructing relationships – the latter by using elements of GT within the theoretical framework of AT.

Figure 5 summarizes these steps in a newly-synthesized generic framework that provides a roadmap of the analytical processes followed. The figure depicts the series of phases by blocks – some being blocks within container blocks – linked by connectors to indicate the progression.

Input to the framework comes in the form of a *hermeneutic unit* containing raw data in textual format, which emanates from multiple data sources. The purpose of the first two phases – the standard GT-techniques of open- and axial coding, respectively – is to *open the data* in each case. In phase 1, open coding is employed to *identify concepts*, while in phase 2, axial coding is used to *discover categories* from similar concepts.

In phase 3, with the data now opened, we move away from GT-techniques to favour AT-techniques that allow us to *reconstruct* the opened data, i.e. put it together in new ways in order to make sense of it. Hence, in phase 3, instead of using the GT-technique of selective coding to identify the core category, related categories are *grouped into classes*. These classes can be viewed as subcases.

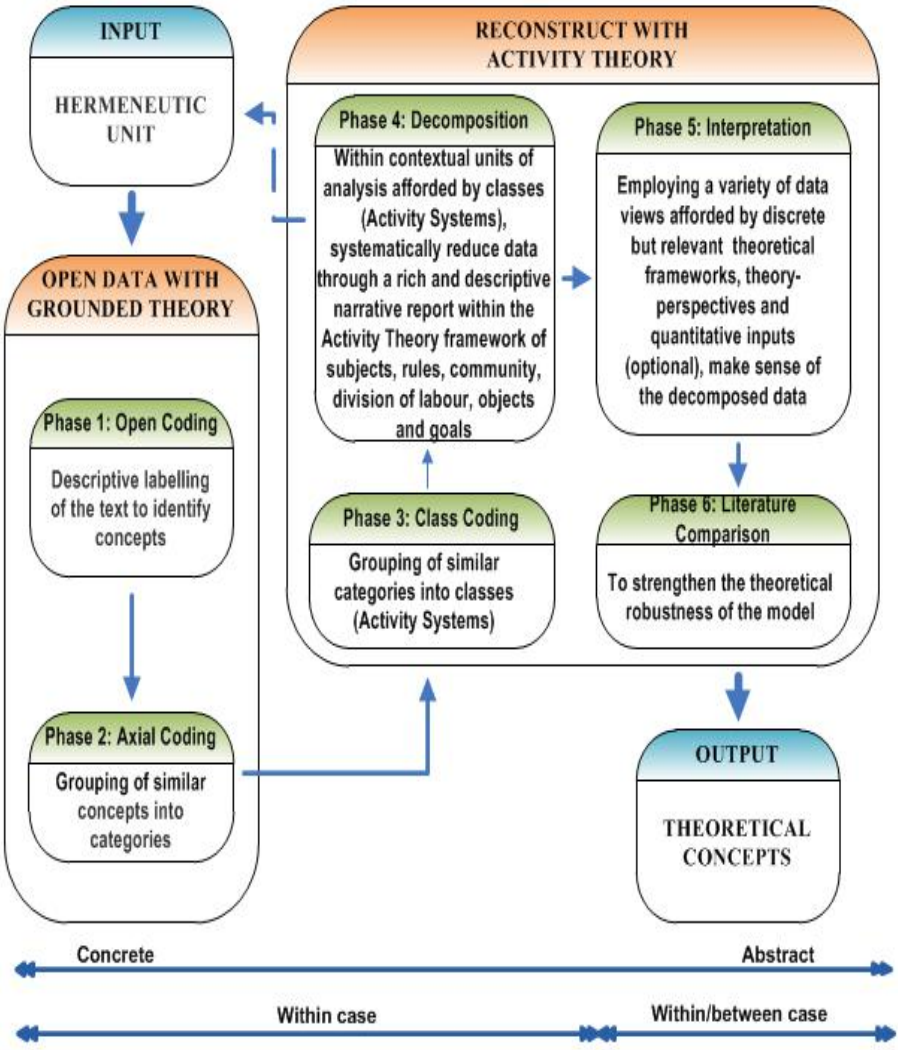

Figure 5. A Framework to Integrate Grounded Theory and Activity Theory in Qualitative, Contextual Studies

In phase 4, these subcases offer contextual units of analysis, or Activity Systems, in which the opened *data is reduced (or decomposed*) by way of a rich narrative report. The classic AT framework of subjects, rules, community, division of labour, objects and goals, provides the necessary

scaffolding to decompose data in context. As indicated by the broken line connector from the 4th phase back to the 1st phase, the process is repeated for each additional polar case.

In phase 5 – continuing with the AT-driven reconstruction (or modelling) process – decomposed and within-case data is *interpreted* and put together in new data views by *mapping it to relevant theoretical frameworks*, theory-perspectives and/or quantitative inputs. Where appropriate, new data views are constructed between-case to complement within-case views. These discrete perspectives aim to make sense of it all by maximizing the investigator's access to the evidence. The products (or findings) that emerge are *theoretical constructs*.

In concluding and consolidating the reconstruction process, a 6th phase, namely, *literature comparison*, is incorporated to strengthen the theoretical grounding of the findings. A secondary, but important, purpose of this phase is to avoid an over-emphasis on inductive reasoning, whereby theoretical sensitivity could be ignored in favour of 'creativity' that leads to 'retroduction' or immersion into 'alternative shaping of observation and explanation, rather than an ex post facto discovery of explanatory ideas' (Katz 1983: 133-134). It serves as a potential counter against premature closure and under-analysis of data associated with the Partial GTM. It allows the researcher to 'lift' ideas from the data and explain them theoretically, thus giving meaning to descriptions of the behaviour (Skodol-Wilson & Ambler-Hutchinson 1996). Literature comparison is a recognised GT-technique which, in this study, is incorporated with the reconstruction phases because it provides additional data sources within the AT focus.

Following the reconstruction phases, the output in the form of *theoretical concepts* that emerge from the integration of GT and AT, may be one or more of the following:

- Themes or patterns that characterizes the activities within a particular domain;
- Models of good practise in the domain;
- New theoretical constructs;
- Notable facts and relationships; and
- Tentative predictions.

The framework closely relates to what Yin (1984) refers to as embedded design, or multiple levels of analysis in a single study afforded by more than one unit of analysis. While this is a Partial GTM approach, it adheres to several essential standard GTM principles:

- *The use of multiple data sources*: These sources converge on the same phenomenon, and have been termed 'slices of data' (Glaser *et al.* 1967). As a multifaceted approach, there are no limits to the techniques of data collection, the way they are used, nor the type of data collected (Pandit 1996). Furthermore, the use of multiple data sources enhances construct validity and reliability (Yin 1989).
- *Triangulation across various data collection techniques*: This is particularly beneficial in theory generation, since it provides multiple perspectives, supplies more information on emerging concepts, allows for cross-checking, and yields stronger substantiation of constructs (Orlikowski 1993).
- *The (optional) use of quantative data*: Supplementary quantitative data provides a synergistic view of evidence (Pandit 1996).

The framework presented in Figure 5 does not claim to generate 'theory' in its truest sense. However, the activity of collapsing a single case into several distinct classes provides subcases that, when viewed and interpreted from the perspective of Activity Theory (via Activity Systems), offer a deeper understanding of processes and outcomes of individual cases and a good picture of locally grounded causes, effect and especially context. In addition, the insight gained from combining various data views is accentuated by using different theoretical frameworks to create such views.

To conclude it is apt to cite Van Maanen (1988), who states that qualitative authors desire to tell 'tales of the field' that convey:

> … their methodological rigor, but also methodological flexibility; their intimacy with - while maintaining their distance from - their subjects and data; and, their fidelity to the tenets of objective inquiry, but also their feeling for the persons and events they observed. In this endeavour, qualitative writers want their reports to be as true as science is commonly held to be, and yet as evocative as art is supposed to be (Van Maanen 1988:xviii).

In the Introduction and earlier in this section, we refer to Strauss and Corbin's (1990) criticisms of partial approaches to GT. Our proposed framework overcomes the shortfalls in that, first, a systematic and explainable process is presented by which concepts are constructed on various levels of abstraction and, second, relationships between categories are explicated and emphasized. We suggest that the framework provides a Partial GT-approach, yet with methodological rigour and flexibility. This, in turn, is synergistically enhanced by integration with the lens of AT intimacy that produces a level of theoretical credibility not normally associated with either the partial GTM or single case studies.

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