Should the Use of Different Research Models for Networked Learning Lead to Different Results?

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ABSTRACT
This paper investigates the relationship between two theoretical models of research (Grounded Theory and Activity Theory), research design and research outcomes. Taking a previous study of networked learning using Ground Theory as a reference point, these issues are considered in two stages, firstly we consider the differences that should result if the theoretical views are followed systematically and secondly, the particular tools and processes that should be used. The differences discussed suggest that the theoretical basis for a methodology should, and does, have an effect on the research outcomes. If we are to progress in networked learning researchers should, at the very least, understand how different models ought to be applied and apply them consistently.

Keywords
Grounded Theory, Activity Theory, Research Methodology, Networked Learning

INTRODUCTION
The study of networked learning (nl) faces researchers with questions of methodology in considering how to study the field. As in other similar fields, for example computer supported collaborative working and learning technology in general, there are a wide variety of approaches to choose from and the majority are drawn from other disciplines including social science and computing. A further difficulty rests in an often twofold requirement of researchers – a desire to both separate understanding what is happening from improving the use of technology for the future. Such wishes are echoed in a variety of publications including (steeples and jones, 2002, halverson, 2002, nardi, 1996b, conole et al., 2002, beetham, 2001, etc.).

In this paper we revisit a study of the use of learning management systems as an example of Networked Learning and consider a particular issue raised by a referee of the subsequent journal paper (Alsop and Tompsett 2001). The referee suggested that the use of Grounded Theory (GT) offered nothing new to the field since the same result would have been obtained from using Activity Theory (AT). Here we explore this suggestion by: a re-consideration of the choice issues in determining what the benefits of using GT or AT were for the study; a comparison of the processes of using GT and AT for analysing the original data; and then considering the impact of the outcomes on the study of NL.

In order to undertake this we will first offer quick reviews of both GT and AT and compare the philosophical foundations of each methodology.

For the purposes of this paper we will use Steeples definition of NL:

> *"Networked learning is learning in which information and communication technology (C&IT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources".* (Steeples and Jones, 2002, p.6).

There is not only a requirement for 'connections' here, but also 'learning'.

GROUNDED THEORY – A SYNOPSIS
Grounded Theory (Glaser, 1978, Glaser and Strauss, 1967, Strauss and Corbin, 1990) was designed as a research model that would resolve one of the key problems in social science: how to research the personal (situated) views of others without superimposing the non-situated personal view of the researcher. This problem has two facets: to avoid testing a hypothesis and remaining at a descriptive level.

The danger of hypothesis testing through a scientific model is that the view either fails to see what is relevant or removes the essential differences through the use of statistics. The danger of description is that is too localized and produces a description of value only to subjects. Grounded Theory offers a research methodology that remains grounded in the conceptual structures of the subjects but yet produces a theory that can be used to understand and predict the reaction of these and similar subjects to future change. Controlling the influence of the researcher on the research process is the central issue in GT.

GT produces a meta-model (a core category and associated axial model, see Strauss and Corbin, 1990, p.96) to describe the behaviour of a well-defined community that shares a perception of an issue that is not shared outside the community. The model produced has few methodological constraints, but the methods and process that are used to develop the model, (the theory) are detailed and require care in their application.

Whilst the initial stages of the research are localized and influenced by the researcher, the end point is not. For more details of the methodology, and the reasons why this approach was used in the original study see (Alsop and Tompsett, 2001).

ACTIVITY THEORY – A SYNOPSIS

Activity Theory stems from the soviet model of social psychology and is strongly grounded within the work of Vygotsky (see for example (Wertsch, 1985)) and later developed by others such as Leontev. It has developed into a well-established approach to software development and interface design – (Nardi, 1996b), particularly as applied to collaborative working [[Halverson, 2002 #185]] and more recently to Higher Education and C&IT (Scanlon and Issroff, 2002).

Activity Theory sets out to account for the relationship between why individuals and groups behave, and how they organize themselves and their environment to achieve this. This approach is anti-reductionist: – none of the components can be understood in isolation (reference).

Within Activity Theory each ‘activity’ is a complex system requiring both objects in the real world, communities and individuals (Kuutti, 1996, pp. 27-8). These systems are bound together by three types of relationships: 'tools', 'rules' and 'division of labour'. These three relationships are also bound together creating a balance that reflects the knowledge of the community for that activity, a change in the components with reestablishment of this balance represents a change in the knowledge of the community (Kuutti, 1996), There is no possible separation of activity and context. What takes place is the context (Nardi, 1996a, page 76). Failure to identify these complex inter-relationships in a human activity is a failure to apply Activity Theory.

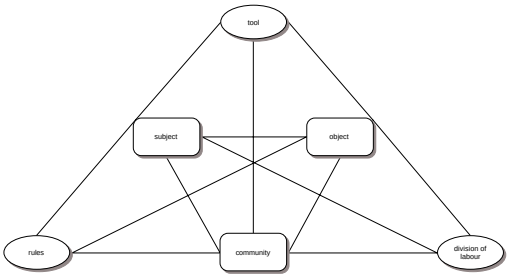

Figure 4 Complex Model of an Activity System after Engeström (Engeström, 1991)

The behaviour of individuals in society is accounted for in terms of activities – which provide the unit at which motivation applies. Each activity will consist of a number of actions by one or more individuals, which will progressively transform an object from raw materials through to a finished ‘product’ (Kuutti, 1996, p. 11). In turn each action is achieved by a number of operations (Kuutti, 1996, p. 32). Operations are characterized as being performed ‘automatically’ whereas actions will require careful planning, control and potentially co-ordination during execution.

The critical distinction between activities and particular actions is that the first requires a motive. Actions achieve transitions that progress an activity. Actions can occur in several different activities, but no single action makes sense without reference to the motive for the complete activity.

Learning within such a model is a process of working with those who are more expert. Within a model more closely aligned to Higher Education a student constructs a personal model through activity within communities within which they live. Learning and teaching results from interaction with those with more expertise. The rate at which something is learned depends on an individual’s Zone of Proximal Development, defined by Vygotsky as “the distance between ‘actual developmental level as determined by independent problem solving’ and the

higher level of 'potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (Vygotsky cited by Wertsch 1985, pages 67-8).

Activity Theory readily recognizes the impact that the computer has had on providing an external representation for many issues that would otherwise have been strongly dependent on the individual's capacity to process information at an abstract level (Kuutti, 1996, p.34 f.) (within the internal plain of action (Kaptelinin, 1996, p.51-2)).

It is tempting to believe that improvements in networking of computers will therefore lead to a matched improvement in communication.

INITIAL COMPARISON OF GROUNDED THEORY AND ACTIVITY THEORY

A series of questions will be used to draw out the underpinning philosophical similarities and differences between GT and AT. These aim to identify issues that affect the appropriate use of such theories and the resulting 'baggage' that comes with choice and application.

How is data collected?

GT: Through qualitative collection using the subjects' own words. These are assumed to be a valid reflection of their own understanding.

AT: Similarly, through such collection methods, but AT carries an ontology with it. There are naming conventions that have to be adhered to. Furthermore, members of the community are understood to have different levels of expertise (e.g. novices and experts) and thus the data will have differing degrees as regards to its reliability that is dependent upon the level of expertise of the part of the community involved.

GT and AT will usually share similar techniques in the early stages.

What is the relevance of the researcher's knowledge of the subject being studied?

GT: This is disregarded as much as possible, and then managed.

AT: This is treated with caution except where there is a clear overlap between the community of the researcher and the community of the subjects.

What is the framework for analysis offered by the theory?

GT: GT requires little but the creation of an axial model.

AT: In contrast AT requires the use of a naming convention and application of a meta-framework.

Does the methodology enable the development of a theory?

GT: Yes, a theory is grown through an iterative process that challenges any potential boundaries that exist with the current data set.

AT: No, the outcome is descriptive, but looks towards informing design and the creation of an artifact for the community in question. AT will argue the a 'theory' is irrelevant.

This does suggest that there are key differences that would occur through a re-analysis using AT of the original GT study. To enable the re-analysis a summary of the original GT work follows.

THE ORIGINAL GROUNDED THEORY STUDY

This section covers a walk through the processes of GT within the original case study. It is not the intention to provide a full account (for this please see (Alsop and Tompsett, 2001). What has been included here is sufficient detail to support the following comparison with AT that follows.

The study encompassed 49 students who had experienced 3 different learning management systems. The initial focus was upon the differences between three learning management interfaces/systems used by these students. Since we wanted to understand these differences from the students' point of view, but we, as researchers, had

clear views about the interfaces and systems being used as well GT clearly provided a suitable framework to support this investigation.

The initial stage was to ask students to write two accounts, with as much detail as they could remember, of the occasion on which the use of one particular LMS had been 'the most rewarding educational experience' and the 'worst educational experience. The remainder of this section continues with a description of the process.

GT allowed us to document this initial data yet be sensitive to the potential influence of our own views. This formed an additional part of the collection process. Part of the initial coding was also undertaken by the students during this phase. This provided and additional check that the language used was grounded within the language used by the subjects (similar to ethnographic and phenomenographic approaches). We then continued the process of coding (open coding).

This seeded the first phase of analysis process, which then continues through a cyclical and iterative process. Data collection triggers model building, which guides further data collection. This leads to the creation of a theory - an axial model (Strauss and Corbin, 1990, p. 96).

This axial model presented a key step in understanding the students' behaviours, and what were the critical changes in design that would have an impact on the students' use of the system. Figure 2 below shows this (from Alsop and Tompsett 2001). This is a framework that establishes the interrelationships between the concepts within the open coding. This developed the interpretation of the students' perceptions of the problems that were being solved, for example the conditions controlling what was possible, the choices that were open to them and their assessment of what was successful and what was not.

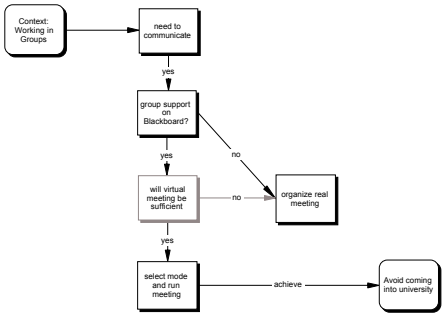

Figure 5 Axial Model

However, this highlighted areas of information that were not privy to us. For example, why have a virtual meeting? The answer to such a question required further data collection.

The next stage was the establishment of a 'core category'. This was achieved by identifying a single bounding concept. This core category encompasses the framework within which all of the students' perceptions were be included. In reality there was a constant cycling between the last two stages; the intention was to develop a theory for which the core category provided a summary that allowed all the data to be interpreted within the axial model and hence the core category. Figure 3 illustrates the core category from the study.

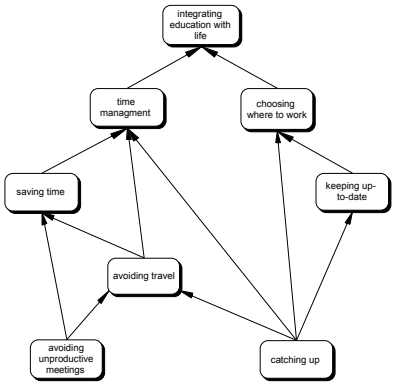

Figure 6 Core Category

Although some designers in NL will be reassured that the axial model makes much use of networked learning, for example such as connectivity and access to resources. The key issue that all these students are trying to resolve, focused upon issues that enabled better time management and information to inform choices about where to be. NL and its use did not lead to the students identifying benefits in terms of education.

Although the study was set up to produce a comparison between interfaces, the subjects' model of what was relevant became increasingly dominant. This has allowed the research to broaden to a wider set of students. This work remains to be reported.

ACTIVITY THEORY

Re-analysing the original research

The reanalysis of the Grounded Theory research is presented in four sections: defining the activity, initial data collection, analysis, and validation, These sub-sections do nor necessarily reflect the work that should be done but are structured to allow for comparison with other approaches to research and the influence that the methodology has for the research process itself.

Defining The Activity

The original question that provided the focus for the original research was to identify which of two VLE systems provided a 'better' interface, working with a group of students who had significant experience of using both. This is not a suitable starting point for Activity Theory. The particular 'tool' that is used for an activity depends on many other issues: on the complexity of what is to be produced, the actions that can be performed by others, the other 'tools' that can be used, the time available, etc. (see Johnson and Nardi, 1996). Activity Theory requires us to begin with an activity within a community and a motive.

Normal communities experience a steady change in membership. In Higher Education, there is a clearer separation between the 'learners' and the 'teachers' within the institutions, which raises the question of whether the 'learners' and the 'teachers' act as a single community, or two, or more?

Defining the community (retrospectively) for the case study is not problematic. The community includes the students, the lecturers and the University support staff working on the particular courses involved. Defining the motive for this group is more complex.

Within the Grounded Theory study, which only focused on the views of the students, discussion of motive, if any, was varied, though many discussed the benefits that were gained (along with the frustrations they experienced). Within Activity Theory the most likely explanation would be that the process of data collection focused too heavily on the actions and goals (where the systems worked) and revealed examples of the operation/action level where the systems failed. Identifying, after the event, the motive for any behaviour, whether of staff or students is difficult.

This may suggest that the Activity Theory fails if it is not possible to identify a motive, but this is not the case. Rather than identifying any particular motive that must, by assumption, control the behaviour of the group that follows, consistency between the motives stated and the actions should be used as part of the validation of the model.

Initial Data Collection

The processes used to capture initial data share many techniques. Activity Theory requires the researcher to show how members of the community understand the 'tools', 'rules' and 'division of labour' that are used in an activity, and show how a series of actions is used to produce the final 'product'.

The use of some (non-virtual) tools, and any task sharing, can be collected through observation, and documentary material can be inspected. Care must be taken: such items are not the same as the use of 'tools', 'rules' and 'division of labour' within an activity. If the researcher is content to collect lists of the different 'tools', 'rules' etc. and resorts to quantitative data, and ignores more subtle and contextualized detail, they will fail to produce results that are relevant to Activity Theory.

Approaches such as those used in the early stages of GT could be considered e.g. with unstructured interviews, focus groups and discourse analysis. It is essential to account for all aspects of AT: goals, motives, distinction between operations and actions, as well as the virtual 'tools', 'rules, etc. that are not observable. The methods used by the researcher must be chosen to capture the dynamic, situated, inter-relationship between such elements. Some group-based techniques are almost certainly essential to record some examples of the negotiation of meaning.

Analysis

Although AT shares the same grounding in data as is critical in GT, the phases of analysis differ significantly.

The control of data capture and analysis in AT is directed towards completing a coherent description of the research data that reflects the meta-model that defines an 'activity'. The meta-model is more detailed and more structured than in GT, but acts to guide the data collection exercise, rather than to provide a framework that transcends the data level.

This is not to suggest that the method is purely descriptive. The structure of the meta-model is intended to understand not just the current behaviour of a community engaged in a task, but also to understand both the failure of existing designs and the design of future systems.

The discussion of the results from the original study noted that little evidence was made by students regarding their motives, with the comment that this might reflect the process of data collection – highlighting actions with one tool rather than activities. An alternative view must always be possible i.e. that the researcher's own conceptualization is invalid. This conceptualization of a group as a community and behaviour within this community as one (or more activities) becomes valid with the production of a description of the community and the activities.

This is not to suggest that the method remains as essentially 'local' as with action research. Existing research will reflect the inter-action that exists between similar communities on a wider level, influenced by parallel activities, common actions and shared objects.

Validation

The validation of work can be seen in two stages: as an assessment by the researchers that work is completed, and as an assessment by the external world. Both of these stages within AT are (of course) modeled on AT itself.

There is no sense in producing a 'validated theory' that is 'correct within itself' since the theory, as an 'artifact' will only have meaning within a community. The first stage, requires that the wider community of researchers would recognize that the 'tools' and 'rules' etc. of Activity Theory have been used as they should be used, which results in a finished artifact. This requires that the artifact is of value to another (or the same community). In networked learning this should allow the research to be used to change the 'tools' and 'rules' etc. to change the design of the learning systems that are used. When this research is no longer used, the research becomes meaningless.

A COMPARISON OF THE TWO SOLUTIONS

So clearly AT should not produce the same results as GT, Despite this there are still some commonalities. If we want to know why systems do not work, then we must understand the situation from the user's point of view. Both AT and GT provide theoretical positions to link the reason for human activity and actual behaviour when using computers and networks to support their own learning.

In terms of differences, the tools that are used by the researchers in GT are implicit in the work whereas in AT the tools are those that are used by researchers and are accepted as being the correct tools for producing 'research' within the socio-constructivist model. In AT, if the model does not fit then one of the terms 'community' or 'activity' has been misapplied. In AT there is a 'strong' model of learning; an attempt to model a learning community that is founded on a contradictory model of learning, will almost certainly find a confused community!

Through the process required in GT the theory becomes independent from both the subjects' and the researcher's framework. (Glaser, 2002).

EPILOGUE

This summary concentrates on the issues raised for networked learning and is presented as a (less theoretical) challenge to the technological view of tools for learning (too often repeated), where networked communication is provided as an alternative to other forms of communication:

The Myth of Networked Learning
Learning is constructivist
Constructivism requires communication
Discussion boards support communication
Networks allow more people to communicate
So: discussion boards are essential for learning
This paper argues that it is only when the detail is added that the real meaning can be read

From the AT point of view:
Learning is socio-constructivist (on principal)
Constructivism requires communication
between the right people with the right tools at right time
Discussion boards support communication
with text, slowly, without regard to time and with poor co-ordination
Networks allow more people to communicate but
but mostly those who know less than I do
So: Communication via discussion boards should be expected to contribute little to a co-ordinated set of experiences for learners. It is just the wrong kind of discussion board!

From the GT point of view, this becomes:
I and my colleagues are struggling to cope with everything in life and
I am struggling to make sense of what I am meant to understand (constructivist?)
I require access to what I want when I want it (situated – i.e.
tools, lecturers, 'the useful students', other people's answers, the lost notes)
Discussion boards support communication (but
unless your are forced to use them, or
you can 'borrow' someone else's good ideas
they do not have any purpose
Networks allow more people to communicate but
I can't afford to waste even more time
AND hardly any students are in University any more
So: I use SMS to sort out how to meet up face-to-face when we really need to!

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