

# Ethnography in a Mathematics Education Context: Fieldnotes as part of Reflection and Analysis

Peter Howard

Australian Catholic University

*The analysis and reporting of the research process involved in an ethnographic study depends on the consistent recording of detailed fieldnotes. This paper discusses some of the component and temporal issues involved in the analysis and categorisation of a set of fieldnotes written during an ethnographic study which investigated the expressed views of parents, students and teachers towards learning mathematics. Analysis has resulted in a framework of five categories being suggested for the initial analysis of reflective fieldnotes.*

## Introduction

The purpose of this paper is to share with mathematics education researchers part of the personal journey undertaken during an ethnographic study that investigated the expressed views of students, parents and teachers towards mathematics and the learning of mathematics. As a result of the analysis and categorisation of a set of fieldnotes some of the research process issues encountered during the study and their consequences for mathematics education research are discussed.

There is a process of reform in mathematics education taking place which acknowledges that students, teachers and parents are involved in the learning process (Wood, Cobb Yackel & Dillon, 1993). As this is the case the social and cultural contexts in which this learning takes place should become an aspect of all types of mathematics education research (Atweh, Cooper & Kanes, 1992). For researchers not to consider these contexts at all is to not

recognise the complexities of the mathematical context for learning and teaching. For researchers to focus only on the social and cultural contexts when working with many community groups is probably too simplistic a view. In addition to these two contexts, some researcher attention to the political, economic and historical contexts that effect the students' learning of mathematics may well provide a better view of the overall learning process. In working with people to better appreciate the complexities of the contexts in which mathematics learning takes place, a deeper understanding and appreciation of the interactive skills used during the research process will benefit researchers and make their findings more credible in the eyes of the public (Howard, 1994).

Recently in mathematics education, there has been a call for the use of a variety of research methodologies to investigate the student learning that takes place in the mathematics classroom (McLeod, 1992). One such method used to study the complexities of schools and classes is ethnography. It is a means of learning from people with participants sharing their story with the researcher and the researcher using fieldnotes, observations and interviews to gather data (Delamont, 1993). The focus of the researcher is the interpretation of the actions and expressions of the participants

(Delamont, 1993; Eisenhart, 1988). This has been a difficult method for mathematics educators to adopt. However, as mathematics education research comes to consider and examine the complexities of the mathematics classroom and the links between cognition

and affect, more use of this method is becoming evident (Nickson, 1992). In order to continue a critical view of such research methods, clarification of both design and analysis of data needs to be maintained (Howe & Eisenhart, 1990; Conostas, 1992)

Mathematics education researchers may enter a field of study having read much but perhaps not being fully aware of the day to day events that one must encounter related to people and aspects of the implementation of the study that the researcher may have to plan for and respond to at the instant. To date, there has been little focus on mathematics education researchers writing their story and sharing their research process experiences with others. Fieldnotes are crucial in recording the daily events that occur in the life of an ethnographic study. This paper focuses on the role of fieldnotes, the categorisation of recorded fieldnotes and how this data can add to the overall understanding of the research process. The categorisation of a set of fieldnotes written during an ethnographic study are provided as a means of adding peer rigour to the analysis of the data and for the consideration of the use of these categories in the initial analysis of reflective fieldnotes. Bringing to public discussion the private development of categories may well add to the public credibility of the use of qualitative methodologies.

## **The Study**

In 1993 the author began a negotiation and consultation process with Aboriginal and non-Aboriginal community and educational agencies to undertake a study focusing on the affective domain and the learning of mathematics (Cutmore & Howard, 1995). This was a detailed process clarifying the purpose of the study, to investigate the expressed views of parents, students and teachers towards mathematics in the last year of primary school, and seeking approval to enter the field. Through this process, a school was

nominated and after meetings with the Principal, school staff, community groups and the two Year 6 teachers, the school agreed to become involved in the study at the beginning of 1994.

This school was a two stream primary school in the western suburbs of Sydney. There was a teaching staff of nineteen and the school had four hundred and twelve students with an increasing number of children coming from Asian countries. The school also had a full time Aboriginal Education Assistant with specific roles and responsibilities in the area of Aboriginal Education. This educator was appointed by the New South Wales Department of School Education as there were forty three Aboriginal children attending the school.

The parent community was viewed as working class, made up of a diversity of cultural backgrounds comprising twenty two different nationalities. An Aboriginal community centre had been established a kilometre from the school and a significant number of Aboriginal people, primarily Darruk and Gamilaroi, lived nearby. There were a number of assisted Housing Commission homes within the community and there were many children who came from single parent and de facto family backgrounds. Many families had more than two children with most of these children being primary school age or younger.

The study was a cross cultural ethnographic design investigating affect issues related to mathematics education. Fieldnotes were maintained of the negotiations between the researcher and various groups leading to the researcher's on site attendance. Daily notes were used to record observations, reflections and analytical thoughts as they occurred in the field and it is the categorization, analysis and discussion of these that are now shared.

## **Method**

The consistent and detailed use of fieldnotes is crucial in ethnographic studies ( Delamont, 1993; Bogdan &

Biklen, 1992). During this study, fieldnotes were written in private as soon after an event happened as possible, or as personal reflections emerged. Every effort was made to maintain the fieldnotes as events happened. Throughout the study the author had to be aware of the personal biases and values brought to the site and how they may have affected the fieldnotes in what was written down and how it was written.

Their writing was a means of organising one's thoughts, clarifying issues, developing initial analysis and allowing for the possible linkage of what initially appeared to be independent yet often connected occurrences. The descriptive fieldnotes acted as a record of what was read, observed or heard during each day. The reflective aspect of fieldnotes focussed on ideas, hunches, feelings, suggestions and impressions. The personal feelings about an event, the ideas generated and the connections made during the study would impact upon the later interpretation of the collected data and needed to be recorded. The fieldnotes in this study focused primarily on the description and personal reflections of daily events.

The fieldnotes, shared in this paper, comprised the entries for the four weeks from February 28th till March 28th, 1994. These were more than just diary entries. They took the form of being descriptive, in describing events and people observed, reflective of the instances that occurred throughout the study and analytical as categories for interpretation began to appear. Events related specifically to the study and to personal experiences about the community which impacted on the study were recorded.

### **Analysis of Data**

Constas (1992) has suggested that there are two domains concerning the categorisation of fieldnotes, 'the components of categorization' and their 'temporal designation'. The first domain involves the origin, verification and

nomination of categories. The second relates to when categories were nominated: that is before the study (a priori), during it (iterative) or after the study (a posteriori). For the discussed set of fieldnotes, category nominations were initially created during the iterative phase based on a rational approach focussing on the functional consistency of the categories (Constas, 1992). There was some collapsing of the categories a posteriori.

It is within this framework that the fieldnotes were scanned, initially, for an overall impression and then analysed in detail to identify emerging categories. It was considered that all fieldnotes were within the context of the study thus they were analysed as a continuous report disregarding the barriers of time, date and location. Three broad categories : descriptive, reflective and analytical were used for the initial analysis of the fieldnotes. Descriptive refers to the recordings of the site including buildings, the geography of the location and the make up of the population. Reflective were those fieldnotes generated from personal thoughts about people and events. Analytical refers to those initial interpretations linking data and leading to initial interpretation and emerging categories for in depth analysis.

After these three broad categories were identified, a further analysis of the reflective fieldnotes was undertaken to identify and label any independent categories. The categories that emerged originated from an investigative perspective based on the constructions of the researcher.

### **Results**

Five major categories emerged from an analysis of the reflective fieldnotes. For each of these categories further sub-categories (dimensions) were identified, however this discussion of results will focus on five categories. The categories were defined as fieldnotes related to:

the planning of actions for maintenance of the study  
the researcher's interactions with others  
the impact of experiences on the researcher  
the site and location of the study  
the area of investigation

organisational  
relational  
personal  
contextual  
topical

### **Organisational**

2.3.94

Throughout the study, there were reflective fieldnotes indicative of organisational issues that helped to set the direction of the study, suggested possible scenarios to be considered and identified organisational factors to be considered. Examples taken from the fieldnotes related to the overall organisation of the study, the order for interviews to be held, selection of the interviewees, the location for interviews, communicating to teachers the daily interview schedule, the writing of fieldnotes, the maintenance of approval channels within the school and leaving the site of the study.

Need to identify a location for the students that is not new or novel for them that may give a view of a 'power location'. Most children see the office as a place where the power of the school is perhaps better to have a location for interviews that is more 'child friendly'. But then you have no say for that is the only location available or that is where it is suggested that you go.

4.3.94

Felt quite apprehensive as I drove out to the school: thinking of going into the school, the welcoming from the staff, how many parents had given permission, the sequence of events for the days ahead. It does have a life of its own and needs to be pursued in the context that things are happening.

Never assume, keep going through channels seeking permission from those in charge. Keep linking in with staff. Four weeks is long enough. I'm starting to feel that I've been around long enough. Not sure that I'm learning anymore from the children.

28 2 94

Children in a group may not be the best way to do a reflective interview. Perhaps best to have one at a time for a better personal response. Children are hesitant to admit their own difficulties in front of other children.

21.3.94

Best to sit down with the respective teachers to organise an interview schedule that does not interfere with the activities of the children and their work.

1.3.94

Child from one of the year six had to be asked for, perhaps a reflection of the teacher's ownership/interest in the study or I imagine more correctly just forgot about the interview. I had to go down and ask if it was o.k. for the student to come. I was going to do it this morning but the teacher wasn't here before the first interview. Need to make sure that each morning I check with teachers about interview arrangements.

### **Relational**

Reflections on relations with the participants emerged throughout the fieldnotes. They concerned personal views on the role of the researcher in the school, the need to build a trusting and respectful rapport with the staff, the degree of contact with the Principal, maintaining the momentum of relationships, reporting to people, the external evaluation of my presence within the school, my presence and function in the staffroom, relating to Aboriginal parents, insights into the detailed observations of children and the personal use of school resources and the impact on relationships. Examples of the category are outlined below.

It is of major importance that I fit into the school community as someone who is accepted and as time goes by as someone who is seen as not intimidating anyone and not causing any anxiety or cause or concern amongst the staff. The school cannot be disorganised or distressed because of my presence. In the long term the school must be better off because I have been here. Need for constant processes of effective, consultation and communication with staff and children and parents.

28 2 94

Building up a very good rapport with the boss and the two teachers and children involved. Need to maintain a friendly but professional relationship with the teachers - you don't become involved with the staff or children - they don't want to be your friends. You have an identified role and that's what you stick to.

1.3.94

It is important to keep in contact with the principal, to report back, to validate interviews and their comments and to consolidate your position in the context.

1.3.94

Reported to the principal about one of the interviews and some of the issues/beliefs that came out of that interview. He commented that I had been very unobtrusive about the school, teachers are interested and I have mixed well with the children in the yard and the classes.

7.3.94

I seemed to read anxiety and concern in Len when I was in his room. I worked hard at supporting him, developing trust in the relationship and not showing any personal views.

15.3.94

Very important to visit the staffroom regularly at lunchtime/recess to keep in touch with goings on about the

school; the interaction amongst the staff; their opinions about aspects of the school life; future plans that the school may have.

17.3.94

I always keep the office clean and rearrange the furniture at the end of the day to the same way that the Assistant Principal has his furniture set up. Need a letter of thanks to the children and parents and a gift for the two teachers involved in the study.

25.3.94

There were far more relational fieldnotes than any of the other categories. This is indicative of the intense interpersonal nature of ethnography. It is through recording, acknowledging and reacting to such fieldnotes that the effective and efficient implementation of the study can be maintained.

#### Personal

The analysis of any research process includes how the study impacts upon the researcher at a personal level. During this study there were reflective comments about the personal energy required to maintain the study and relationships, aspects of the site that annoyed the researcher and personal issues related to leaving the site.

Exhausted today after transcribing one interview last night - no one told me how hard a task that is. Still not sure if I'm getting a handle on anything though some issues are being raised.

2.3.94

The open door policy really grates me when I'm having a meeting with the principal and anyone can come in.

10.3.94

A good choice to finish today because I'm getting tired and the children are becoming a little familiar with being seen as special children going out after the lesson.

25.3.94

What the researcher learns and reflects about her/himself throughout the research process helps to identify personal issues to be addressed within the study, highlights personal research skills to be addressed and extends the researcher's personal skills for the future.

### **Contextual**

As the study evolved and participants came to trust the researcher, more comments about the actual site were more forthcoming. Such comments and reflections broadened the researcher's knowledge of the site. Fieldnotes, categorised as contextual, provided an opportunity to view and interpret aspects about the site that impacted on those within the school.

Gee you two teachers go everywhere together.

Oh haven't you heard the rumours. We're lesbians! That's what happens when you're a dole bludger and you've got all the time to make up rumours. Yeah that's why we both wear engagement rings.

3.3.94

I am sitting here realising that the school is always fairly calm. It is a secure environment for most of the children.

4.3.94

### **Topical**

This category identified personal thoughts and participant comments about the teaching and learning of mathematics. Fieldnote examples related to the context of learning mathematics, teaching mathematics, content areas of mathematics, the use of calculators and the role of textbooks in teaching mathematics.

We really need to know about and acknowledge the context of both school and home that children and teachers have to learn mathematics.

4.3.94

Len's comments in an informal meeting were children have to be directed for their work to be kept neat, well presented. At the beginning of the year kids would write sideways across the page, draw a tattoo in the top corner. I can feel the daggers in the back but you have to keep on top of them to get them back to their work standards after holidays.

9.3.94

At recess Brian, the year 6 teacher, came into the staff room in not a good mood and mentioned Maths is a health hazard. He had just had a session on times tables and said that he was going in for the second round after recess.

16.3.94

Spoke with Brian at recess. He focussed on the use of the calculator and tried to talk about its use in assisting children to do the algorithm without being hassled by the actual difficulty involved in that....The more he looks at Kookaburra maths the more he realises that the kids would be at a Year 4/5 level. What do you do? Do you teach at the kids learning level, do you teach the curriculum or do you prepare them for high school?

24.3.94

### **Conclusions**

An analysis of fieldnotes reinforces the complex nature of ethnography. Such analyses, related to mathematics education, appear to be rare. It takes detailed planning and consideration of crucial organisation, contextual and interpersonal relationships factors to implement and maintain an ethnographic study. Reflective fieldnotes play a crucial role in the collection of data related to the research process. This analysis and the identification of five major categories may enable mathematics education researchers to better utilise their fieldnotes.

The consistent use of fieldnotes enables the researcher to view the research process in more detail. Analysis fieldnotes provide practical considerations for mathematics education researchers undertaking qualitative research, particularly with the use of ethnography. The development and sharing of this framework of categories may assist others in their initial analysis of their fieldnotes. Further, they may provide a framework for the beginning or further development of the interactive process skills needed by qualitative researchers.

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