What can be learnt by selecting anecdotes from a range of data? Exemplifying "noteworthy" mathematics with a small number of examples.

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Abstract
Analysis of data collected for qualitative research purposescan often generate further research questions, particularly if an open-minded approach is taken. In this paper I examine the use of anecdotes for a purpose other than that for which they were collected. I suggest that this is a justifiable research procedure so long as the questions asked of the anecdotes are appropriate, and the use of the results is sensitive to the mode of collection.

Introduction

This paper is about the validity of selecting and analysing anecdotes from a larger body of data as an extension of the analysis of a larger study. I discuss how and why the anecdotes were selected, and what could be deduced as a result.

The research context

The purpose of the main research project was to develop a grounded theory [Glaser & Strauss, 1967] of teachers' informal assessment practices in mathematics (Watson, 1995). Data from the whole project included pre-interview observation notes, audiotapes of unstructured interviews with thirty teachers about informal assessment practices, longer term observation of ten pupils in two teachers' classrooms and observations of seven in-school moderation meetings.

Teachers were in their normal settings, their own classrooms or staffrooms, aware that they were the focus for research on assessment but were not aware of how the detail was to be used. They will have been more aware of assessment issues than usual because they were being observed or questioned about them. They had not deviated far from their normal practices of informal assessment which depended on the accumulation and development of impressions, complemented in general by accumulation of written artefacts or test scores. These practices are to be seen in the light of recent national training in assessment techniques within a national framework which includes mathematical thinking and processes among its descriptors.

The main body of data

Interview data often included illustrative anecdotes about individual pupils, or pupils in general. Observation notes often included records of incidents which might then discussed with teachers. The long-term observations included stories about individual pupils over a term. Teachers were from upper primary and lower secondary classes, but the illustrative stories they used sometimes came from a wider range of their experience.

There are therefore several different sources of incident in the whole body of data: researcher's observations, teachers' recollections, discussion about observed incidents, written or taped records, and combinations of all these. Incidents which come solely from interview data have already been selected by the teacher to illustrate a point the teacher wished to make; incidents which come from researcher-initiated dialogue, or researcher's observations, are also necessarily selected at the data-generating stage, but the researcher has a responsibility to examine carefully the purposes and criteria for selection.

The method of data-collection recommended by Glaser and Strauss fop cit.] is to recognise that theory is being developed alongside data collection and deliberately to collect the kind of data that will illuminate, expand or refute the emerging ideas. Data collected by a researcher working alone may be particularly susceptible to subconscious editing, so the grounds for all editing need to be made explicit. This research aimed to produce as full a picture as possible of informal practices, and then to expose differences within such practices. Later stages were designed to focus more closely on particular aspects of practice which had emerged as problematic, and to raise questions about their operation. The researcher, therefore, selected incidents to observe, record and discuss which either confirmed practice represented elsewhere in the data, or offered other aspects of practice not yet represented, or which seemed to contradict what had already been learnt. There was a particular interest in data which might relate to justice and fairness in decision making about pupils.

The incidents

During the subsequent analysis and synthesis of a theory of the social justice of teachers' informal assessment practices it became apparent that teachers' decision-making about some isolated incidents did not always follow the patterns predicted in literature about interpersonal judgement. To explore this further within the existing data it was decided to extract incidents of teacher-decision-making from the data in order to begin identification of contributory factors. 'Sameness' and 'difference' between incidents would be explored, and 'sameness' and 'difference' relating to the literature would also be explored. It was hoped that what

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would emerge from these two comparisons would be a picture of what the literature did, and did not, adequately explain.

The purpose of the selection and discussion of the incidents is therefore to *identify, describe* and *contrast* some classroom incidents during which, in some way, exceptional mathematical performance is displayed which the teacher notices and takes into account in her judgements. Incidents are selected which display features which *exemplify* or *counter-exemplify* the influences suggested in the literature and in earlier stages of the research. Features of these incidents can be compared to each other and related to outcomes in terms of teachers' judgements, in order to *indicate* answers to the questions:

What factors influence the teacher to accept a single exceptional mathematical performance as noteworthy evidence to add to her picture of the student's general achievement, and what lead her to dismiss the performance as adding nothing of worth to the picture?

Performance is taken to mean oral, written or physical communication which indicates the results of some mathematical thinking, such as giving answers, making suggestions or indicating something with a diagram. *Exceptional* means different to some norm, either for the class, or for one pupil, or relative to the teacher's expectations. *Noteworthy* means that it was recorded in some way, either mentally or in a formal way, and hence might contribute to the teacher's view of the pupil.

Sample size

The selection of anecdotes was limited in various ways:

- to what was already in the data;
- by the availability of stories which illustrated adequately the kind of incident required for the research;
- by the need to meaningfully compare incidents, i.e. they would need to have some common aspects in order to generate questions about their uncommon aspects;
- to those which related to the literature and previous research;
- to incidents the researcher knew enough about to describe meaningfully.

It must be remembered that the focus for this small study grew at the analysis stage, and hence the data had not been collected with this issue in mind. Most of the research had focused on the accumulation of judgements about pupils, not on judgements made on the basis of one incident. Hence it was not a surprise that very few suitable incidents were

found in the data, and most of those were of students who were initially thought to be weak. Nevertheless it was felt sensible to proceed for two reasons: first, because no other work research has been found on this issue; second, because the aim is to indicate *possible* answers to questions, not to make generalisations.

Given that even a single incident can generate doubts and research questions, it is therefore valid to have a small sample with which to work for the same purpose.

The frame of reference for analysis

Since the incidents have been selected for a particular purpose their use must be restricted to that purpose, otherwise different selection criteria might have been applied. They cannot, for instance, be used to exemplify general behaviour, for they have been selected to display contrasts, not similarities. They certainly cannot be said to say anything definite about the whole field, for the original data from which they were selected has also been subject to non-random selection. Hence one has to be very clear about what can, and what cannot, be usefully found in the incidents.

Another purpose of selection was to relate real incidents to the literature and research, so the incidents were searched for features which related to theory and also for common features which were not related to theory. Briefly, it had been suggested that in order to be thought of as strong (or weak) mathematicians students need

- to produce certain kinds of positive (or negative) learning behaviour [Eisenberg, 1991]
- to produce text which the teacher finds acceptable (or which differs from the teacher's desired type) [Morgan, 1996]
- to respond appropriately (or not) to the teacher's view of mathematics [Brown, 1995]
- to make a good (or poor) first impression [Nisbett and Ross, 1980].

The teacher then
- selects incidents to remember which support her view
- exaggerates them in her perceptions of the student
- ignores contradictory evidence
- sees the student's work in a positive (or negative) light [Nash, 1976]
- is reluctant to change her mind.

Much of the literature on interpersonal judgement derives from laboratory psychology tests and may well omit certain situationally-specific features. Some studies suggest that time pressure and the importance of the decision also have some bearing on judgement. Use of

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anecdotes could, therefore, give clues about further factors which occur in non-experimental situations. Information about whether and how the incidents affected the teacher's decision and how the pupil's mathematical behaviour related to the rest of the group, the teacher's expectations in general and the pupil's past mathematical behaviour was extracted. The features so found are summarised in Table 1 which, while heavily reductionist in nature, nevertheless shows that application of theories of judgement to individual incidents fails to fully explain teachers' use of incidents in decision-making. Search for other common features, not expected from the literature, in incidents which produced similar outcomes can be commenced, and this would only result in *suggestions* for further research.

Table 1: Summary of results from seven incidents

Incident	Existing view	Performance seen as strong relative to:	Concluding view
1	None	Performance of rest of class	Strong, despite lack of confirming evidence, until serious contradiction arose
2	None	Teacher's expectations of class	Strong
3	Weakness	Teacher's values/ research evidence	Still weak
4	Weakness	Teacher's values/ research evidence	Doubt
5	Weakness	Individual's past and whole class performance	Still weak
6	Weakness	Individual's past and whole class performance	Stronger
7	Weakness	Teacher's expectations of class and individual	Still weak

The incidents themselves and a much fuller analysis can be found in Watson [1998].

This is not the place to go into the content of the research further. The purpose is to show how a relatively small number of carefully selected anecdotes, while showing some support for theory, can reveal omissions in existing literature and hence raise research questions, or at least raise doubts about applicability of general literature to all settings. Anecdotes collected for other purposes can, with care and appropriate analytical methods, be used for other purposes.

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