RESEARCH ON ATTITUDES IN MATHEMATICS EDUCATION: A DISCURSIVE PERSPECTIVE

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Abstract: Attitude to mathematics is generally assumed to be a stable and reliable construct. Closer examination, however, reveals, that the specific interrelated conditions in which attitudes are both expressed and studied have a striking impact on the way people respond to research instruments. In this paper, an exemplary analysis of the discursive practices and the resources which are used in the organisation of an interview is carried out. This is leading to a discussion of the problems that emerge when the categories of observers are rashly superimposed on the utterances of the observed.

Introduction

In mathematics education as a theoretical field language plays a crucial role. It is not only the vehicle with which findings are reported and the recent questions of the field are discussed. It also is the most important resource for describing the practice of mathematics teaching and learning. Moreover, this practice mainly is accessible via the language that is used within it (e.g., Adler, 1995; Dowling, 1996; Krummheuer, 2000; Pimm, 1987; cf. Mason and Waywood, 1996). Apart from that, language even serves as the predominating means to examine mental orientations like attitudes where the mental is taken to subsume cognitive, affective and enactive aspects of the psyche. In this contribution, the role of language in the research on attitudes and similar concepts is discussed.

It appears to be well accepted that the mathematics teacher's expectations and attributions on students' learning as well as her beliefs, attitudes and orientations have a substantial influence on classroom practice (c.f., McLeod, 1992; Ruffell, Mason and Allen, 1998; Thompson, 1992). On the side of the students, their attitudes are considered to be very significant factors underlying their school achievement (c.f., Leder, 1992; Ponte et al., 1992). These judgements are based on the assumption that attitudes and the like are relatively stable and reliable constructs so that they can be used for describing a person's mind. According to Ajzen's (1988) definition, attitude is "a disposition to respond favourably or unfavourably to an object, person, institution or event" (p. 4). If, in contrast, an individual's attitude was something situational bound, the concept would lose some of its effects. On the other hand, if too stable, the concept would go down in value for descriptions of change processes in mathematics teacher education or student's learning.

After having undertook a set of empirical studies of attitude, Ruffell, Mason and Allen (1998) doubt the stability and reliability of what is considered an attitude. In their research, they experience attitudes as highly influenced by the social and emotional conditions in which they are both perceived and observed. In the end, they challenge the very construct of attitude as a fruitful taxonomy for research or for the practice of teaching. In essence, it can be considered as questionable whether people actually possess attitudes and the like, or whether these constructs are just categories of observers who wish to account, by language, for what they claim to see. This looks very much as if a discussion of this issue under a discursive perspective could be promising.

Theoretical position

According to Austin (1962) and Searle (1969), language is a human practice. People use it to get things done. The fundamental tenet of Austin's and Searle's speech act theory is that all utterances state things and do things. What constitutes a speech act can be analytically divided into three parts (c.f. Ricœur, 1978): The act of the speech itself (propositional act), that what we do in the speech (illocutional act), and that what we do by means of the speech (perlocutional act). The words 'shut the door' can be used as a request, or with the force of an order. Alongside the specific meaning of the words (their proposotional character), the specific way in which the words are spoken make for the illocutional act of the speech. Finally, this very way in which the utterance 'shut the door' is spoken may have the stimulating effect of making the hearer anxious or annoyed (the perlocutional act). It may produce a certain reaction on the side of the hearer.

Austin and Searle offer a highly social perspective on language: Ways of talking are considered as social acts. They draw the attention to conventions in the achievement and performance of actions through talk. In their view, language use is embedded in a social environment that has a strong impact on the way in which a speech act is perceived. On the surface, this issue is intuitively taken into consideration when an interview about a person's attitudes to mathematics is organised. The interviewer may arrange the interview conformably to the social conventions for interview situations, she may care for an undisturbed room and a relaxed atmosphere where the interviewee feels safe and willing to express her opinion about mathematics.

Less obvious, and rarely considered in empirical studies on attitudes, is the fact that the interview talk itself is a social construction in which the speakers do things with words. The interviewer tries to stimulate the interviewee to put into words what she thinks or feels about mathematics. This is done in a more or less sophisticated way but it has to be methodically controlled. What the interviewer's questions and utterances intend to do is part of the interview strategy. On the other side, the interviewee is not just the victim of the interviewer's questions. With every of the interviewee's utterances something is stated or done. Or, as Ricœur (1978) put it, the

utterances in themselves state things and do things. Thus, by giving a specific response to the interviewer's stimuli the interviewee is constructing a particular version of what the interviewer later on will call an attitude: the interviewee's talk carries an action. The interviewee organises her utterances along social conventions of how language is used in interview situations but not without taking into account her own goals and aims within the interview.

Traditionally, the conventions of how language is used in the way social life is put together are studied within the field of conversation analysis (e.g., Sacks, 1992; Sacks, Schegloff and Jefferson, 1974). Conversation analysis, an approach based on the discipline of ethnomethodology (e.g., Garfinkel, 1967), reflects upon every utterance as locally meaningful and conditional for the course of the talk. By studying talk as an object in its own right, conversation analysts found out that the way talk is formally organised is not a creation of individual persons but shared across collectivities. For instance, turn taking within everyday conversation is predominantly organised by a structural feature known as adjacency pairing: a question requires an answer, a greeting a return greeting. Results like that allow access to the modes of operation of how words do what they do.

Taken together, these features suggest language should be of enormous interest in the study of attitudes. Such a discourse oriented and sociopsychological perspective has been elaborated under the label of 'discursive psychology' (e.g., Edwards, 1997; Potter and Wetherell, 1987; Smith, Harré and van Langenhove, 1995; van Dijk, 1997). In order to draw a clear dividing line between cognitive and discursive psychology, it can be stated that cognitive approaches generally try to configurate unambiguous results by systematising the reactions of the participants in a specific setting. In contrast, discursive psychology reflects upon descriptions, explanations and justifications given in the course of a talk or a written report. The analytical task of a discursive psychology is to take apart, to split up such descriptions and justifications. It is studied in which ways consciousness is constituted through discourse (Lerman, 2000): when and how peoples express explanations, how they position them strategically compared with alternative justifications, and in which sequence descriptions, justifications and explanations are produced.

> We reject a product-and-process psychology of mental development, where mind is viewed as an objective development outcome. In its place is a discursive-constructive notion of mind as a range of participants' categories and ways of talking, deployed in descriptions and accounts of human conduct. (Edwards, 1997, p. 48)

The discursive psychological perspective is sensitive to the relation between an object and its description. It challenges both the existence of attitudes in the mind of interviewees and the alleged objectivity of interviewers' classifications. To put it in slightly drastic terms: The attitude categories used by the observer to classify the interviewees' utterances may tell us more about the observer than about the interviewees. Discursive psychology, however, determines the discursive practices

of the people under study as well as the resources (e.g., systems of categories, narrative characters, interpretative repertoires) which are used in the organisation of the discourse. Discourse is considered as cognition-in-action.

Under the perspective of discursive psychology, some traditional sociopsychological concepts have been revisited (e.g., Edwards and Potter, 1992; Potter and Wetherell, 1987), but not within the field of mathematics education. In the following, an example from my own research is analysed in order to demonstrate how the discursive approach has an impact on the practice of research on attitudes in mathematics teaching and learning. It is not intended to give a comprehensive discourse analysis but to focus on some details that already show the significance of a discursive psychology for mathematics education research.

Example from research

The passage I want to discuss originates from an audio-taped interview with a student teacher. The interviewer is a peer and the interview is done at the interviewee's home. As a matter of course, the passage is derivative in at least three aspects: firstly, it is part of the transcript of the interview and as such already focussed on, secondly, the focus is on the words and not on their pronunciation, lastly, it is a translation from the German original. Points in brackets symbolise seconds of silence and do not represent parts that have been omitted, italics refer to paralingual recordings.

> Interviewee: all right then with mathematics I firstly connect (..) with mathematics I firstly connect numbers (...) then any formulas and (.) yes mathematics is simply driving me to desperation *(laughs)*

Straightaway, this counts as a negative statement to mathematics. In terms of attitudes, the interviewee explicated the construct mathematics and gave her opinion on it. Thus, the interviewee should be considered, or classified, as a person with a desperate attitude to mathematics, in particular to numbers and formulas. On a fictitious Likert-scale to an item 'I like mathematics' this could be translated into a marker at the total-disagreement end of the scale, both by the participant of the study and by the observer. But when we look at the course of the interview the situation gets more complex. After the laughter of the interviewee, the interviewer remained silent for a moment. According to conversation analysis, such ignorance of a turn giving marker may result in an explanation (or, sometimes, a repair) of what has been uttered previously. Apparently, the silence, here, invited the interviewee to extend her response:

> Interviewee: all right then with mathematics I firstly connect (..) with mathematics I firstly connect numbers (...) then any formulas and (.) yes mathematics is simply driving me to desperation *(laughs)* (...) well from first to fifth grade mathematics was

> really great fun that is it was not my favourite subject or so (.) but I liked it like all other subjects and it was absolutely okay (.) then we had a new absolutely stupid incompetent teacher she was absolutely unqualified (.) she has then no mathematics at all (..) been able to teach us and from this moment onwards mathematics was nothing but driving me to desperation (..) didn't like

Now, what previously has been said about the interviewee's attitude to mathematics should be withdrawn and modified. For grades 1 to 5 mathematics had not been driving her to desperation: *Mathematics was really great fun*. Therefore, we cannot certify her anymore a totally desperate attitude to mathematics. Moreover, the passage reveals that less the numbers and formulas account for the partly desperate attitude, but the *absolutely stupid* new teacher. Apparently, the personality of the teacher dominated the mathematical content as long as the generation of a positive or negative attitude to mathematics was concerned.

In the end of the passage, the interviewee uttered *didn't like*. On one hand, we can interpret this as a judgement about the teacher, but this is not so surprising when we take into account that the teacher was previously attributed to be *absolutely stupid*, *incompetent* and *absolutely unqualified*. Rather, the moderate expression would be astonishing. On the other hand, *didn't like* can be read as in relationship with mathematics. Thus, it could have served as a mitigation of the beforehand expressed desperate attitude to it. According to this interpretation, on the fictitious Likert-scale the interviewee would have made a second marker because she felt bound to develop her first opinion. As a matter of fact, this is more easily done within interview situations than on questionnaires. As a result, the context by which utterances are framed is influential in two ways: Firstly, the organisational and methodical setting in which the research is conducted influences the manner of the utterance. Secondly, the surrounding textual association of an utterance is leading to a more profound or, at least, modified understanding of it. This issue is well acknowledged in traditional cognitive psychological research when it operates with interviews or observation. In the case of data collection by means of questionnaires the textual context in which single items occur, that is their sequence, is often neglected and the responses to the items are treated as isolated judgements.

Further, in the first part of the passage the interviewee characterised mathematics as numbers and formulas and immediately concluded that mathematics was driving her to desperation. So, on a first view, the numbers and formulas take the responsibility for the negative attitude. But this is inconsistent with the fact that numbers in particular are of paramount importance in primary mathematics, and that was a time when mathematics was really great fun. The clue, here, are the first words in the passage: *with mathematics I firstly connect*. This introduction, especially the word 'firstly', points to the possibility that the following statement should rather be regarded as spontaneous and immediate than as a reflected definition. Consequently,

in the second part of the passage where the interviewee starts to reflect on her school experience, this first characterisation of mathematics is of less importance. Thus, the passage under study results to be stratified: After the short common sense introduction, an explanation on a higher level of reflection is given. What firstly appeared to be an inconsistency within the interviewee's attitude now proves to be an organisational aspect of the text.

Another striking aspect of the passage is the choice of words by which the interviewee tried to convincingly describe her attitude to mathematics. At several points, she used what Pomerantz (1986) has called an "extreme case formulation". If, for instance, somebody argues *'nobody in his right mind ever needs calculus in his life'* this can express an argumentative support of his own lack of understanding of calculus. It is the purpose of extreme case formulations to verify a judgement at its extreme limits. In the first passage, mathematics was *simply* driving her to desperation, formulas were *any* formulas. Then, mathematics was *really great* fun, it was *absolutely* okay. The new teacher was *absolutely* stupid, *absolutely* unqualified and has not been able to teach mathematics *at all*. The interviewee's repeated use of 'absolutely' can be interpreted as putting all the blame on the teacher in order to release herself from any participation in the generation of the desperate attitude. The interviewee's extreme case formulations can indicate that she is used to explain her relation to mathematics as outwardly determined.

Implication for future research

These observations clarify two points: Firstly, some information on the parts of a discourse that surround an expression can be sufficient for challenging what beforehand has been putatively proved as a reasonable interpretation of the utterance. Secondly, it has been demonstrated that interviewees' responses, as any discourse, are organised according to certain aims. In the case that has been analysed, the interviewee's construction and formulation of the response make it easier for her to impute accountability for her desperate attitude to the teacher.

These points are of the greatest importance for the attribution of attitudes to individual persons, and their classification. The interpretation of a single isolated utterance can lead to oversimplified, distorted or wrong evidence - not to think of starting from a simple marker on a scale. Apparently, attitudes, if ever regarded as a meaningful construct, are far more complex than all what can be deduced from a one-dimensional judgement. The transcript analysed above offers some insight in what the interviewee considered spontaneously as mathematics and how she judged these issues. But it is highly problematic to take this specific judgement for the interviewee's attitude to mathematics.

This critique signifies that a simplistic separation of the construct 'attitude' from its position related to a single dimension of judgement is critical. Whenever attitudes to mathematics are imposed, this implies the existence of a homogeneous and

consistent understanding of what mathematics is. But this is, obviously within the passage, a fiction. Before giving a judgement, the interviewee explained what it is that she is going to judge. Again, this explanation is not a neutral description of mathematics. Instead, the concept 'mathematics' is actively reconstructed by the interviewee's utterance, it is defined in a specific situation. This argument also invalidates a simplistic separation between the object and its description.

If we want to find out how and what people think and feel about mathematics, we should resist the temptation to rashly superimpose our system of categories on people's talk or people's responses. A more sensible approach starts with the reconstruction of the systems of categories, the narrative characters and strategic devices of the people under study in order to understand the organisation of the discourse first. Such scrutiny may reveal that what people think and feel about mathematics is not stable and consistent but strongly situational and more or less determined by context. Admittedly, the discursive approach tears us away from, and beyond, attitudes.

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