ABSTRACT. Teachers’ attitude to mathematics is increasingly put forward as a dominant factor in children’s attitudes to mathematics. Our intention at the beginning of this study was to produce instruments for teachers to use in probing student attitudes as part of their personal professional research and development. To this end we undertook eight small studies of attitude carried out across the educational phases, which we report on here. Reflecting on them led us to challenge the very construct of attitude. We are also led to challenge the cause-and-effect model underlying much attitudinal research. We now see attitude as at best a complex notion, and we conjecture that perhaps it is not a quality of an individual but rather a construct of an observer’s desire to formulate a story to account for observations. The difficulty in making attitudinal research precise, and in testing the validity of attitudinally based conjectures, lies therefore in conceptual and hence methodological issues.

1. INTRODUCTION

In looking over the directions of research in mathematics education, we detect a growth in attention paid to the role of attitudes of teachers. There appears to have been a shift from concern with student’s understanding of mathematical concepts where the teacher was seen as a subject matter specialist, through recognition of the potential influence of teacher’s expectation and attributions on students’ mathematics learning, to study of the influence that beliefs, attitudes, orientations and Weltanschauungen have on classroom practice. This movement was summarised by Hoyles:

Underlying the growth of interest in attitudes is a pervasive background theory that teachers can influence students’ performance: the underlying problem is seen to be to determine how causes produce effects, so that teachers can be more effective.

Our initial aim was to locate effective ways of probing and revealing attitudes which would be easy for teachers to use as part of their own enquiries into informing their practice. We therefore embarked on a series of eight studies during 1994 and 1995 involving children, undergraduates, undergraduate trainee teachers, graduate trainee teachers, and experienced
teachers, under the assumption that attitude is a viable construct. The individual studies were each performed separately using different instruments, in different locations, at different times, as befits local researchers probing attitudes in ways that seem relevant and appropriate to their context.

2. ATTITUDE AS A CONSTRUCT

The word attitude originally referred to aspects of posture (as in to strike an attitude) which expressed emotion. It was then applied metaphorically to the mental (an attitude of mind) from which the metaphoric indicators were dropped, leaving simply attitude as a mental orientation. Herein lies a source of confusion of course, because modern academic psychology, in common with ancient traditions, distinguishes between cognitive, affective, and enactive aspects of the psyche. Sometimes the mental is associated with the cognitive in opposition to the feelings in the affective, and sometimes the mental is taken to subsume all aspects of the psyche.

We began with the implicit assumption that there is a ‘something’ which is labelled attitude, and that is a multi-dimensional construct with three interwoven components: cognitive, affective and conative: (Ajzen, 1988 and Triandis, 1971)

- cognitive: expressions of beliefs about an attitude object,
- affective: expression of feelings towards an attitude object, and
- conative: expressions of behavioural intention.

At the beginning of the century when Allport (1935) and others were beginning to research into ‘attitudes’, researchers viewed attitudes in a single dimension (as either beliefs or feelings) which, naturally enough, coincided with the colloquial meaning of the word. With the evolution of a multi-dimensional view of the construct of attitude, attitude as a technical term became rather distant from its colloquial sense.

There has been some considerable discussion about the position of beliefs within this multi-dimensional structure. Silver (1985) and Schoenfeld (1985) (cited in McLeod, 1989, p. 32) expressed the view that belief systems lie on the border between cognition and affect whereas Oppenheim (1966) views beliefs as being in an upper layer of consciousness with attitudes and values being in lower levels. Distinguishing beliefs and attitudes requires additional ontological commitment to seeing beliefs and attitudes as aspects of one construct, and it is possible that the ontology arises because of a desire to produce a cause-and-effect mechanism to explain the generation of behaviour rather than as a description of an extant entity.