ABSTRACT. Since 1981 a study of the way in which prospective mathematics teachers see mathematics teaching has been carried out using procedures derived from Personal Construct Theory (PCT). It was found that PCT procedures were very useful. They gave student teacher another way of analysing and reflecting upon mathematics teaching as he or she changed from university oriented mathematics graduate to school oriented mathematics teacher during the one year teacher education programme. Another conclusion was the PCT procedures could be used to investigate "practitioners maxims": to explore the practical basis of mathematics pedagogy. This paper discusses how PCT procedures may be used to assist mathematics teachers and others to study teacher thinking.

INTRODUCTION

From 1981 to 1983 a study of the way prospective teachers of mathematics developed their stance to mathematics teaching was carried out using procedures derived from Personal Construct Theory (PCT) (Kelly, 1955). The prospective teachers were mathematics graduates enrolled in a one year teacher education programme. Each student was asked to complete one or more 'repertory grids'. These grids were analysed using INGRID72 (Slater, 1977). The results of the analyses were discussed with each student in a counselling situation. The repertory grid is a matrix, each cell representing the construal of an element (column) by a construct (row).

The intention was to examine some common assumptions, beliefs or established notions about mathematics teaching and to test a methodology, and a perspective drawn from Kelly, which seemed to be useful for understanding teaching generally and for mathematics teaching in particular. In turn there would be implications for mathematics teacher education. As the study progressed a monitoring of change in student perception over time was included. Later PCT procedures were used on a trial basis to assist in counselling students as they developed a personal "philosophy" about mathematics teaching. A detailed description of the study is available in McQualter and Warren (1983).

The intention of this paper is to suggest some possible uses of PCT procedures in the study of mathematics teaching. A particular use is in teacher self-evaluation and as a way of studying teacher thinking and practical knowledge. A teacher's practical knowledge can be an important source in developing a pedagogy of mathematical knowledge: pedagogy in the sense of how mathematical knowledge is organised for transmission.
Such a pedagogy would enable teachers of mathematics to discuss, analyse and reflect on their own teaching. It can also provide a basis for improvement of practice and for induction into teaching by providing an explicit body of knowledge on mathematics pedagogy. To understand the development of this interest the following background is provided.

MATHMATICS TEACHING: A PERSONAL VIEW

This personal view is described in *Mathematics, Mathematics Teachers* and *Mathematics Teaching* (McQualter, 1983). Several points become clear.

First the teacher is 'central' in teaching and curriculum development. Each mathematics teacher holds differing views about the teaching of mathematics but these views overlap to form a body of accepted professional practice. These views can be called beliefs about mathematics teaching in that they guide teacher actions in coping with changing curriculum and classroom contexts. As Rogers (1979) points out the beliefs are about mathematics, child development, educational psychology and the relation of teaching and learning. Initially the beliefs had been called practitioners' maxims by Davis (1967) and later private theories (Bishop, 1971).

Second the study of teaching had been valuable in delineating components concerned with classroom management and instruction. However, the research did not seem to explain why teachers developed certain teaching behaviours and how they made certain decisions. As Fey (1980) has pointed out most models of teaching use a systems approach which tends to give a false view of teaching. Fey says that much of mathematics teaching, both in planning and presentation, has an informal unsystematic flavour relying on an older, informal tradition. Was this 'practical knowledge' a simpler form of teacher belief systems? Studies of teachers and their teaching had, over 30 years, produced a list of variables in teacher behaviour which were highly effective (Begle, 1979, p. 115). However, research on teaching used observation and quantification of teacher behaviour. Relationships between teacher actions and pupil learning were inferred: some variables being of “high inference” others of “low inference” (Cooney, 1980). Teaching is a complex activity and is difficult to categorise or reduce to a set of discrete components. Furthermore, much of the research on teaching has been on teaching in general. Cooney (1980, p. 456) asked to what extent such results could be transferred to mathematics teaching?

Third, there was the change in the perceived role of the teacher in the 1970s, both by those involved in studying teachers and those studying the nature of curriculum development. Surveys of research on teaching began