Quality Mathematics Teaching: Describing Some Key Components

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Survey responses of 125 teacher educators and experienced teachers to fixed-format and open-response items on aspects of mathematics teaching are presented. A qualitative analysis of responses revealed six major categories. These were Communicating, Problem Solving, Building Understanding, Engaging, Nurturing and Organising for Learning. Within each of these categories, the frequency of use of particular phrases and descriptors indicate general beliefs about the important characteristics of quality mathematics teaching. There was a great diversity in the language used to describe particular components. A model is proposed which suggests a way in which the categories are linked.

Background

We asked about 200 primary and secondary mathematics teachers who were attending a mathematics education conference to view a videotape of a primary school classroom in action. In the videotape, the children sat on the floor while the teacher asked questions and gave directions to individuals about particular activities. The teacher appeared sensitive to the needs of the children and relaxed. The class used shapes made from pieces of carpet as the teacher led her pupils to make mathematical generalisations about triangles and to express in their own words their ideas about the shapes made.

Although we had expected different perspectives to be expressed about the short snippet of videotape, we were surprised that, after watching the video, the conference participants ranked the teacher's actions in remarkably diverse ways. For example, groups of participants were asked to indicate where the presentation of the teacher ranked on a scale from

imposed \hspace{1cm} \text{negotiated}

There were some groups who rated the teacher presentation as totally imposed. These groups commented that the teacher had imposed the lesson structure since she had chosen the materials and she had asked the questions. There were also groups who rated the lesson as highly negotiated. Such groups argued that all of the content of the lesson had arisen from the responses of the pupils, and so was negotiated with the pupils. There were also groups who rated the lesson at various points along the scale. All participants had viewed the same lesson. This lack of consensus of interpretation was also evident in many other aspects of the lesson.

Although it is difficult to rate lessons accurately from brief videotaped excerpts, it is somewhat alarming that commonly used terms such as "imposed" and "negotiated" have so little professional meaning that practitioners could use

1. An abbreviated version of this paper was presented at the 1993 MERGA conference.
both terms to describe the same teaching. It may be that our professional language is vague and has not been subject to the sort of rigorous challenge which forms the basis of the development of meaningful theories. This article is an attempt to contribute to debate about the way we describe teaching and to present one way to articulate the components of teaching.

The aims of the research reported here were to determine whether there was consensus in views of teacher educators about features of quality lessons, to identify trends, to use the trends to define components of teaching, to clarify these components by listing behaviours which would be grouped under each component, to justify the groupings of behaviours by presenting raw descriptions of the teaching behaviours given by teacher educators, and to present a model of how these components are linked. It was intended that this model contribute to clearer descriptions of teaching as well as to an articulation of the goals of teaching.

Survey of Teacher Educators’ Views on Quality Teaching

The data presented in this paper are from a survey which sought to determine the components of teaching which were considered important by teacher educators.

The survey arose from earlier studies into perceptions which teacher education students had of the mathematics teaching they observed during practicum (see Mousley & Clements, 1990; Mousley, Sullivan, & Clements, 1991). It appeared that the student teachers’ perceptions of the teaching that they observed were the antithesis of current pedagogical theories and of behaviours espoused in teacher education programs. Over a range of schools, year levels and geographical positions, students reported curricula driven by texts and tests, teacher dominance of discourse and thinking, and little attempt to make mathematics relevant to children’s lives or to individual understandings.

There seem to be two plausible explanations for the perceptions of these students. On the one hand, it may have been that observations made by the teacher education students are an accurate portrayal of current teaching in mathematics. On the other hand, it is possible that these teacher education students may have observed some quality mathematics teaching but may not have identified the features of such teaching because of the subtle and sophisticated ways in which it differs from mediocre teaching. In any case, it seemed clear that student teachers were not having the types of experiences in schools which would assist them to develop learning environments and teaching strategies which might support knowledge construction.

It seemed that the next step would be to draw the attention of the teacher education students to the important aspects of teachers’ behaviour in some way. The first task was to seek some broader informed views on what constitutes important aspects of teaching. This was the purpose of the survey, some results of which are reported here.

The substance of the survey was drawn from authors who have considered the implications of a constructivist view of knowledge for teaching (see, for example, Gergen, 1985; Lerman, 1989; Wheatley, 1991), from recommendations for teachers (e.g., Australian Education Council, 1991), and from instruments for structuring