THE USE OF TALK IN MATHEMATICS

The statement ‘talk is but one element of language use’ becomes highly significant when considering mathematics classrooms. Whereas in other areas of the curriculum the words and syntax used in oral discourse are closely related to those employed in written communication, this is untrue for mathematics. Here the written forms are symbolic rather than verbal, and one cannot therefore assume that notions concerning relationships between oral and written language derived from other disciplines will necessarily transfer to the learning and teaching of mathematics. The learning process becomes more complex, because, for understanding to take place, children have to construct mathematical meanings from experiences that, at least initially, are embedded in everyday language and “everyday language” can have slippery, changing meanings sometimes encompassing more, sometimes less, than the sought after mathematical meaning. Only after this can mathematical symbols be introduced (Pirie, 1997). There is no one-one correspondence between the written and the oral. Indeed, this is not the only linguistic transition that the mathematics learner is expected to master. Mathematics also has its own verbal register, which is composed of a combination of mother-tongue words, many with distorted or specialised meanings, and additional new vocabulary, quite specific to mathematics (Pimm, 1987). Consider the differences between: “Four threes are twelve”, “the product of three and four is twelve”, and $3 \times 4 = 12$. From the perspective of the teacher, how can one know what and how much understanding is encapsulated in students’ own use of the mathematics register, unless the students can also express themselves in everyday language and function with the symbolic representation? The three facets of mathematical language are inextricably woven together.

EARLY DEVELOPMENT

Historically, the connections between language and the teaching of mathematics tended to be thought of purely in terms of symbolic representations, teacher talk and students’ factual answers. The interest in the value of oral communication is thus a comparatively new one. ‘In general … mathematics classrooms are places where you do mathematics not where you communicate or discuss mathematical meanings’ (Bishop, 1985, p. 27). There have even been attempts to produce textbook series that aim to teach mathematics pictorially and symbolically without any
verbal distractions, but such ventures overlooked the fact that the meaning that students bring to the symbols will of necessity be grounded in their earlier, verbal experiences.

Among the earliest publications to address the value of classroom discourse including that in mathematics lessons, were those of Barnes, notably Barnes, Britton & Torbe (1969) which became influential in raising awareness of the power of analysing talk in the mathematics classroom (see also the section on Early Developments in the review on Effective Educational Talk). Aiken in 1972, and Austin and Howson in 1979 set out to review research into language and mathematical education. The paucity of published research in this area, however, led Austin and Howson (p. 175) to suggest that ‘in most classrooms the teacher does most of the talking and that few pupils respond’ – a statement which continued to be true for many years to come. Notwithstanding this state of affairs, in the early 1980s researchers in places as far apart as Britain, Japan, France and America, were starting to focus their interest on talk, and attempting to describe oral situations that they felt needed further exploration. The problem at this time was that there was little or no understanding of the specific nature of mathematical talk and so in 1982 Harvey et al endeavoured to ‘document rather than philosophise and theorise’ the phenomenon (p. iv). A growing interest in both problem solving and small group work was also fuelling the attention being paid to talk, but it was without a doubt the governmental Cockcroft Report (1982) which brought the role of discussion in the mathematics classroom to the forefront of British teachers’ awareness, in a manner similar to the effect that the National Council of Teachers of Mathematics (NCTM) Standards documents were to have on teachers in America nearly a decade later. While challenging the automatic assumptions of the efficacy of pupil-pupil discussion, two early responses to Cockcroft sought to clarify the nature and effects of the phenomenon and laid the ground work for much of the research that was to follow (Hoyles, 1985; Pirie & Schwarzenberger, 1988).

**MAJOR CONTRIBUTIONS**

The study of talk in mathematics can be approached from three different perspectives: it is possible to examine the talk itself, qua talk, or to explore it as a medium through which teaching and learning can happen, or to use the analysis of talk as a vehicle for the exploration of other classroom events. In the first of these approaches, the actual words the students and teachers use, the explanations they give, their familiarity with the register, the occurrence of unorthodox language, and the use of metaphors are all of concern. There is a need for informal language to precede formal expression and Richards (1991, pp. 15–16) contrasts the ‘language of mathematical literacy’ with what he calls “number talk”, illustrating