LOST IN SPACE: PRIMARY TRAINEE TEACHERS' SPATIAL SUBJECT KNOWLEDGE AND THEIR CLASSROOM PERFORMANCE

Claire Mooney and Keith Jones

Centre for Research in Mathematics Education, University of Southampton, UK

The knowledge of mathematics that elementary teachers bring to their teaching is recognised as a significant influence on how successfully they teach mathematics (Fennema and Franke, 1992; NRC, 2001) yet this is more complex than simply requiring a grasp of mathematics content (Ball, 1990; Ma, 1999). A number of studies have examined trainee elementary teachers' knowledge of number, and how this knowledge is related to their teaching competence (for example, Rowland *et al*, 2000). This study extends this work to examine graduate primary school trainee teachers' knowledge and understanding of spatial concepts.

The theoretical framework being developed for this study builds on suggestions that Shulman's (1986) model of teacher knowledge may be too simplistic (see, for instance, Cochran, DeRuiter and King, 1993) and incorporates Ma's (*ibid*) notion of "profound understanding of fundamental mathematics" (PUFM). One aim of the study is to determine what form of geometrical knowledge is needed for the effective teaching of spatial concepts.

Data comes from audits of trainee teacher knowledge and confidence together with assessments of their teaching competency. Initial analysis of this data indicates that the trainees' knowledge of geometry is quite poor, certainly poorer than their knowledge of number or algebra. They appear not to recall some topics, may never have met other (for example, the nets of solids), and are unable to solve relatively simple problems such as calculating the surface area of a triangular prism.

REFERENCES

Ball, D. L.: 1990, Teaching Mathematics for Understanding: What do teachers need to know about subject matter knowledge? In M. M. Kennedy (ed.), *Teaching Academic Subjects to Diverse Learners*. New York: TCP, pp. 63-83.

Cochran, K. F., DeRuiter, J. A., and King, R. A.: 1993, Pedagogical Content Knowing: An integrative model for teacher preparation. *Journal of Teacher Education*, **44**, 263-272.

Fennema, E. and Franke, M. L.: 1992, Teachers' knowledge and its impact. In Douglas A. Grouws (ed.), *Handbook of Research on Mathematics Teaching and Learning*. New York: Macmillan. pp. 147-164.

Ma, L. (1999), *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*. Mahwah, NJ: LEA.

National Research Council (2001), *Knowing and Learning Mathematics for Teaching*. Washington: National Academy Press.

Rowland, T. *et al* (2000), Primary Teacher Trainees' Mathematics Subject Knowledge and Classroom Performance. In T. Rowland and C. Morgan (eds.) *Research in Mathematics Education Vol. 2*. London: BSRLM. pp. 3-18.

Shulman, L. S.: 1986, Those who Understand: Knowledge growth in teaching. *Educational Researcher*, **15**(2), 4-14.