

# THE IMPACT OF TEACHERS' UNDERSTANDING OF DIVISION ON STUDENTS' DIVISION KNOWLEDGE

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Whether teaching and learning should focus on conceptual understanding, '*a clear picture of something formed mentally combining all parts and characteristic features*' to form a connected web of knowledge or simply acquire procedural knowledge, '*to follow step by step an established method*' (Collins English Dictionary, 1979), has been the topic of research over many years (Hiebert 1987, Ma 1999). Discrete pieces of information may be needed, but the linkage to other known concepts is of greater significance as it ensures that students understand the mathematics they need to use in novel situations rather than perform isolated computations without meaning.

This study investigated children's knowledge of division and its relationship to their teacher's conceptual knowledge. Children's difficulties with division are well known (Anghileri 1999; Ball 1990; NCTM 2000). They are often expected to embrace division without sufficient concept development as they already have considerable experience of symbolic representations; when reading division they may be unaware of the importance of the order of the division expression; and there is often an inability to interpret the remainder when problem solving.

As the level of teacher conceptual and procedural knowledge will have a significant impact on student learning (Ma 1999), this study investigated:

- the extent to which the depth of teachers' understanding of division translated into student understanding of division
- whether the teacher extended the division concept through problem solving, and how this manifested in an ability to solve division problems

119 children and their teachers were asked to solve the problem *5 students share 2 blocks of chocolate – how much did each student get?* Results were obtained from four Year 7 classes in a range of socio-economic settings and school type. Solutions ranged from an inability to attempt the question, through dividing 5 by 2 (several students and 1 teacher), to applying conceptual understanding in the form of diagrams and meaningful, accurate calculations in which attempts were made to interpret the decimal fraction or remainder that resulted. Those who made more conceptual interpretations of the problem tended to be taught by teachers who also possessed a clear concept of division; poor performance correlated with incomplete teacher knowledge.

## References

- Anghileri, J. (1999). Issues in teaching multiplication and division in Thompson, I. (ed) *Issues in Teaching Numeracy in Primary Schools* Buckingham: Open University Press,
- Ball, D. (1990). Prospective elementary and secondary teachers' understanding of division *JRME* Vol 21, pp132-144.
- Ma, L. (1999). *Knowing and teaching elementary mathematics*. Mahwah NJ: Erlbaum
- Hiebert, J. (Ed.) (1987) *Conceptual and Procedural Knowledge* Mahwah NJ: Erlbaum
- NCTM. (2000) *Principles and Standards for School Mathematics*. Reston, VA: NCTM.