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Following the review of several papers related to various forms of mathematical knowledge for teaching, the issue of exemplification has perhaps been considered peripherally. It seems that there is a need to develop the materials presented on ITT courses for primary trainees to regard the choice of examples as a more significant factor in providing effective teaching and learning. In particular, the question that was raised by reading An, Kulm & Wu (2004) was 'Do the approaches emphasized on ITT programmes enable trainees to have the required conceptual understanding to select appropriate examples?' This **(proposed)** paper considers the current use of exemplification as a concept in ITT and explores ways in which exemplification can be introduced into ITT courses and given greater priority when trainees carry out planning and preparation for teaching. It looks at recent research in this area and offers possibilities for further research to develop the concept of exemplification in ITT courses.

The paper will seek to examine primary trainee teachers' choices of mathematical examples within their teaching against current debates around mathematical subject knowledge. Teachers' knowledge for classroom practice was conceptualised in a seminal work by Shulman (1986) in which he set out seven categories of teacher knowledge. Three categories focus on 'content' knowledge, these being subject matter knowledge, pedagogical content knowledge and curricular knowledge. The paper aims to develop a more critical approach to supporting classroom practice of trainees by examining the most effective ways of using mathematical subject knowledge in planning the use of learning examples. This issue has come to light during my practice in the last few years when observing and assessing trainees teaching mathematics in primary classrooms.

A broad range of literature will be drawn from to inform the research proposals and the interpretation of outcomes, for example studies of effective teachers (Askew *et al.,* 1997), philosophy of mathematics education (Ernest, 1994) mathematical thinking (Mason, 1998) and recent work on exemplification by Watson and Zaslavsky (2007).

The paper will examine the core concept of 'examples' in mathematics teaching, and the way examples are selected by trainee teachers on the basis of their mathematical subject knowledge and their pedagogical understanding of how mathematics is learned by primary age children. One recent and important piece of research which identified examples as a core concept was that by Rowland, Huckstep and Thwaites (2003) who selected a range of trainees based on their mathematics competence in an audit of subject matter knowledge (SMK) and subsequently video-taped a series of their mathematics lessons to analyse classroom strategies. The findings suggested that some classroom actions could be explained in terms of general pedagogical awareness relating to good primary practice, but that other actions were informed by the trainees' specific knowledge of mathematics SMK or mathematics pedagogy. Significant episodes were identified and coded into 18 categories, one coding related to the trainees' choice of examples in their teaching. From reading the work of Rowland *et al.,* knowledge of mathematics SMK or mathematics pedagogy may inform choice of examples, and examining this for proposed research will relate directly to strategies for choosing examples. This however, does not deal with the issue of mathematical subject knowledge. Ma (1999) compared US and Chinese teachers' knowledge of 'fundamental' mathematics, concluding that no amount of general pedagogical knowledge can make up for ignorance of particular mathematical concepts which are addressed by developing appropriate levels of subject knowledge, and any proposed research will examine this issue.

Marton (1997) discussed learning in terms of a process of discerning variation between similar items presented almost simultaneously. He describes the ways in which learning experiences can be varied as the 'dimensions of variation', and by using this approach a teacher could select structured examples, which provide variations for the learner to notice and subsequently learn from. For example, children learning number bonds to 10 could be provided with 9+1 as a first example rather than 1+9 if their calculation method is to count on from the first number. This notion of variation requires a good subject knowledge threshold, and such a view of learning has been extended by Watson and Mason (2005) exploring in depth what it means to use dimensions of variation in mathematical examples, for the benefit of classroom teachers. Further research could examine the extent to which dimensions of variation might be employed by trainee teachers as part of a strategy for selecting their examples.

A further influence on the impact of subject knowledge is described by Bills and Bills (2005) who suggest that trainees are often given advice to use examples that give pupils a straightforward procedure, but which do not extend their thinking or prepare them for a range of variation that may be met subsequently, whether in real life contexts or the examination room. When teachers generate learning examples in their lessons, inhibiting factors such as subject knowledge can influence the range of suitable choices, and this is apparent from my previous work in schools and from currently supporting students with their mathematical subject knowledge as part of their training.

Whilst examples are useful learning objects in mathematics, Zaslavsky and Peled (1996) considered how experienced teachers and trainees generated counterexamples as a particular category of examples. They tried to identify the difficulties faced by teachers when generating examples in a particular topic and secondly to reveal possible sources of difficulty. In this study, the difficulties were assumed, and subsequently found, to be directly related to the level of subject matter knowledge and pedagogical content knowledge which became crucial in later studies of primary trainees by Rowland *et al.* (2004).

Zaslavsky and Peled (1996) also found that experienced teachers had an advantage over trainees in that despite not always making significant use of their more advanced subject matter knowledge, they were nevertheless able to be more productive in their generation of counterexamples as a result of greater pedagogical skills. It is on the basis of examples that learners make their first guesses about a concept, hence the crucial importance of providing appropriate examples if the teacher intends the learners to have a good range of examples to help them develop their concepts, and in order to select appropriate examples, teachers need a secure knowledge base of both subject and pedagogy.

Research should provide insight into the pedagogic considerations by which primary trainee teachers select mathematical examples in their teaching, and how their level of mathematical subject knowledge plays a part in such selections. By categorising the approaches taken, analysis can be made of the extent to which current frameworks accurately identify the role of subject knowledge in primary mathematics teaching. Implications can be identified for future training programmes and links will need to be made to the needs of serving teachers in this curriculum area, since insufficient is known about primary trainees' choices of examples, and less about the choices made by serving teachers.

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