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## **SECONDARY TRAINEE-TEACHERS' KNOWLEDGE OF STUDENTS' ERRORS AND DIFFICULTIES IN ALGEBRA**

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This study investigated trainee-teachers' explanations of students' errors in algebra and their suggested ways for addressing such errors. The theoretical framework for the study is derived from Shulman's (1986) idea that teachers' knowledge consists of several types of knowledge. In the model developed for this research, and informed by the work of Askew *et al* (1997) and Ma (1999), teachers' knowledge about students' errors and difficulties and teachers' belief about mathematics and how it can be taught have been incorporated.

Data gathering involved administering an open-ended questionnaire to a national sample of 251 trainee-teachers of secondary mathematics in 12 institutions in the UK, followed by a small number of semi-structured interviews for the purpose of validating and extending the data from the questionnaire survey.

The analysis of the completed questionnaires revealed that the majority of trainee-teachers explain students' errors in terms of the incorrect application of the procedures for working out algebra problems. Hence, they recommend re-teaching these procedures to the students so that the students might overcome their difficulties. Other parts of the analysis showed that most secondary mathematics trainee-teachers are able to suggest a teaching sequence that takes into account the hardest and the easiest algebra problems. Finally, most of the trainees were able to predict the most likely errors in a set of five algebra problems. However, less than fifth of them obtain  $R^2 > 0.6$  when correlated with Küchemann's (1981) suggestion in regards to the facility level (percentage) of some algebra problems. This indicates that only a small proportion of trainee-teachers understand the sort of characteristics that determine the complexity of an algebra problem such as the number of variables in the problem, the nature of the elements involved and, importantly, students' interpretations of the letters.

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