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Title: An investigation into the nature and coherence of mathematical instructional explanations

ABSTRACT

This study investigated the nature of instructional explanations (IEs) through their features which were used to develop a framework of coherence of IEs. The IEs of six teachers who attended a professional development course were studied. All grade 10 lessons on two topics taught by the six teachers were observed and video recorded. The theory of IEs as elaborated by Leinhardt (2001) was used to examine the features that contribute to the coherence of IEs within the context of mathematics classrooms in South Africa. This is especially relevant in light of literature that illuminates that the IEs of teachers within some South African classrooms, as well as more globally, are characterised by a lack of coherence.

This thesis is structured in two parts. The first part focuses on the features of IEs. A preliminary analysis of the data suggested a heavy emphasis on the use of examples and the use of the chalkboard in the IEs presented by teachers. These preliminary findings were used to re-organise the features of IEs, as highlighted by Leinhardt (2001), to indicate the relationships between them. Teachers' use of examples and teachers' use of inscriptions (e.g. on the chalkboard) and talk were used as lenses to examine the features of IE's. In addition, a third lens was identified through the analysis of the data i.e. a summoning back lens where content used in previous IE's were used again in subsequent IE's that illustrate the connections between them.

The second part of the thesis is a focus on the coherence of IE's. The features of IE's illuminated through the use of the lenses in the first part of the study, together with literature on coherence of IE's informed the features used to develop a framework of coherence of IE's.

The study makes three main contributions to the theory of IEs. First, a re-organisation of the features of Leinhardt's theory of IE's is proposed to illustrate relationships between them. Second, an expansion of the definition of IEs is proposed. Instead of IEs being those that are offered at moments in time, many different IEs may combine to form a composite IE that extends over an entire lesson. Third, a framework is offered that can be used to analyse the coherence of IE's offered by teachers.