

THE DISCOURSES OF SECONDARY SCHOOL MATHEMATICS

Volume 1

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I declare that this thesis is my own account of my research and contains as its main content work which has not been previously submitted for a degree at any tertiary institution.

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ABSTRACT

A systemic functional analysis of the oral pedagogical discourse and board texts of secondary school mathematics lessons differentiated on the basis of school sector, gender and social class is completed through the development of a computer program to handle the linguistic analysis and the construction of a Hallidayan systemic framework for mathematical symbolism and visual depiction. The new frameworks allow for investigation of the unique contributions of language, mathematical symbolism and visual display in the construction of meaning in mathematical texts and the process of semiotic metaphor which occurs in movements between these codes. The systemic analysis of the classroom discourse is situated within a Foucauldian perspective of power, knowledge and truth in mathematics, mathematics education and wider discursive practices involving the private and state school sectors.

The analysis of linguistic patterns, register selections and genres of four Year Ten secondary school mathematics lessons reveals that in private elite single sex schools the male students demonstrate the greatest participation and access to the discourse of mathematics while the female students participate in interpersonal patterns of deference which do not resonate with the tenor dimensions of mathematics. The monofunctional tendency orientated towards interpersonal meaning in the lesson of the working class students at a government school indicates that the social goal of the lesson is primarily directed towards maintaining tenor relations through covert manipulation as opposed to learning mathematics. The limited functionality of practical lessons in mathematics is also demonstrated as a shift from everyday discourse to mathematical discourse does not occur. Mathematical pedagogical discourse is characterised by a dense texture which arises in part from the strategies by which meaning is encoded in mathematical symbolism. As opposed to the lexical density and grammatical intricacy of written and spoken language respectively, mathematical symbolism realises grammatical density whereby multiple levels of clausal rankshift preserve the nuclear configurations of Operative processes and participants which describe relations of parts to the whole and continuous patterns of variation. In addition, inherent difficulties in mathematical pedagogical discourse arise from long implication chains of reasoning and dependence on multiple semiotic resources with the latter resulting in referential complexity and

multisemiotic intertwining of lexical and participant chains and strings. The results of the analysis, interpreted through Bernstein's theory of pedagogical practices and coding orientations and Halliday's formulations of spoken and written language, reveal that the semantic orientation of working class students does not accord with that realised in mathematics.

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