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Exploring mathematizing processes of South African Grade 12 learners for solving additive relation problems

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2021

https://hdl.handle.net/10539/31852

Takane, Thulelah Blessing (2021) Exploring mathematizing processes of South African Grade 2 learners for solving additive relation problems, University of the Witwatersrand, Johannesburg, <http://hdl.handle.net/10539/31852>

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Abstract

Small scale intervention studies have been conducted in South Africa in order to find ways of mitigating low performance in primary mathematics (Dlamini, 2014; Tshesane, 2014). The results in these studies suggest that improvements are possible in the South African context. In this study I embarked on a small-scale intervention in order to explore mathematizing processes of South African grade 2 learners for solving additive relation problems. This exploration occurred in the context of a single school and two classrooms with isiZulu speaking learners, in which one class constituted an intervention group and the other a control group for comparative purposes. A total of 13 lessons across one year were undertaken with the intervention group. Data sources within this study consisted of pre- and post-tests with both classes, and task-based follow-up pre- and post-intervention interviews with the intervention group. In the background I also had learners' written work from the intervention lessons, the researcher's journal, and lesson plans for the work.

The intervention made use of the themes and approaches proposed in Askew's (2004) *Big Book of Word Problems* classroom materials developed in a British context. The problems in these materials are drawn from the categories of word problems developed in Cognitively Guided Instruction (CGI) (Carpenter, Fennema, Franke, & Levi, 1999). The pedagogic approach adopted for the intervention drew on the guided re-invention approach, developed within Realistic Mathematics Education (RME) theory (Freudenthal, 1973), the main theory underpinning this study.

Key findings of the study reflected high gains in performance for the intervention group, which significantly outperformed the control group. Further findings indicate that these gains were underpinned by improvement in sense making of

additive situations by the intervention group which were reflected in the mathematizing processes of these learners. The intervention group also reflected willingness to use more appropriate models to calculate answers resulting in correct answers, which was not the case for the control group.

Beyond the evidence that this intervention approach can support learning gains for African learners in a Home language medium context, this study also contributes theoretically through identifying 'extent of structuring'- evident in the distinguishing of quantities in learners' work – as a factor within the higher gains made by the intervention group and similarly, progress towards use of a more formal mathematical register as also associated with higher gains.