Developing Early Number Learning using Maths Recovery principles

Abstract

National, regional and international comparative data all paint the same dismal picture of South African learners' low levels of numeracy (Schollar, 2008; DBE, 2012; Mullis, Martin & Fay, 2008) which has a detrimental knock-on effect on their mathematics learning in higher grades. One of the recommendations made by Spaull (2013, 2016) and others for the remedying of this mathematics 'crisis' in our country is for the development and implementation of a structured, evidence-based intervention programme in the midst of a lack of teacher knowledge on the ground related to how children learn early number. Bearing this recommendation in mind, this doctoral study was aimed at improving a sample of South African children's early number learning using principles based on the Mathematics Recovery (MR) programme (Wright et al., 2006). I opted to investigate the efficacy of a short-term intervention programme using Mathematics Recovery because this programme sets out a detailed, research-based trajectory for children's early number learning while also providing explicit teaching and assessment guidelines. The scale of the problem on the ground, and my belief that learning mathematics is a social enterprise, led me to adapt the MR programme for grouped intervention. To this end, I used the Emergent Approach (Cobb & Yackel, 1996) which incorporates both cognitive and sociological perspectives of learning as the theoretical underpinning of my study. I employed a teaching experiment using 20 mid-attaining Grade 2 learners that were split into a matched intervention and control group. The 10 intervention learners were then further divided: 2 learners received individual intervention and 8 learners received grouped intervention (two groups of 4 each). The different layers of cognitive analyses allowed me to determine two things. Firstly, learners who received intervention based on MR principles moved further along the early number learning trajectory across all aspects of MR's Learning Framework in Number (LFIN) than the control group who continued with their normal classroom teaching; and secondly, comparable learning gains were made between learners who participated in different formats of the same intervention (individual and grouped). From the sociological perspective, analysis based on aspects of interaction – which focused on learners' oral discourse and solution strategies used across different representational settings – provided insight into the emergent and more specific focus on 'base-ten thinking', which is one part of the LFIN framework. This emergent specificity led to further development of the Base Ten aspect of the LFIN related to progressions and reversions in learners' use of base-ten as inferred from their oral discourse and flexibility in enacting base-ten strategies across various representational settings.