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Application of Webb's depth of knowledge on learners' responses to probability questions

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ABSTRACT

Mathematics performance of learners in South Africa is well below expectations. Studies such as the Third International Mathematics and Science Study Repeat (TIMSS-R) Survey and Southern and Eastern Africa Consortium for Monitoring Educational Quality (SECMEQ) have reported that South African learners' performance in mathematics is lower than the average mathematics performance achieved by learners in other countries. Multiplicative reasoning which is essential for learners' development and understanding of mathematics was a key area of concern in learners' performance. The concern regarding the teaching and learning of multiplicative reasoning in South African schools was the catalyst for the Wits Maths Connect - Primary project conducting a series of short interventions with the aim of supporting effective learning and teaching of multiplicative reasoning at foundation and intermediate phase. This study in particular, is located within the Wits Maths Connect - Primary multiplicative reasoning project aimed at exploring grade 2 learners' multiplicative reasoning skills in the context of the North West province of South Africa.

The broad focus of this study was to explore shifts in grade 2 learners multiplicative reasoning skills after the implementation of an intervention conducted in the North West province. The intervention ran for a period of 6 weeks and consisted of four carefully designed lessons which were taught over four weeks: one lesson per week. The areas focused on in the lessons included multiplicative arrays, linking arrays to division, making equal groups, and linking making equal groups to division. As a form of assessment to understand the effect of the intervention, a pre-test and post-test which was composed of bald number (context free) calculations and word problems (context-based) focused on multiplicative reasoning were administered to the learners. The study contains two research questions. The first one focuses on the shift in learner performance in the pre-test compared to the post test and the second focuses on learners' performance in the multiplicative word problems compared to related bald calculation problems.

There were two key findings which emerged through a quantitative analysis of the collected data. It was found that learners performed significantly better in the post-test compared to the pre-test, and learners performed significantly better in word problem questions compared to bald calculations in both the pre-test and post-test. This therefore provides evidence that the intervention was indeed successful in helping to improve learners' performance and enhance

their multiplicative reasoning skills, and also that multiplicative reasoning context-based problems support learner understanding.