

A Comparison of Rational Number Word Problem Types Across Three Grade 4 to 6 South African Textbook Series

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Being able to interpret the different fraction constructs within problem solving contexts often provides challenges for learners. This paper is based on a comparative document analysis of three of the most popular textbook series for Grade 4 to 6 learners in South Africa. The focus was on exploring the nature of fraction word problem types. Such an analysis sets out to identify the word problem types and how they are presented across the grades and across the various textbooks.

Poor performance in the conceptualisation of fraction word problems in mathematics in the South African education system results from two common problems. Learners have difficulty learning and understanding rational numbers, more specifically common fractions (Zhang et al., 2015), and they also often find it challenging to solve word problems (Giganti, 2007).

In most South African classrooms, teachers and learners work closely with and rely on textbooks and the Department of Basic Education (DBE) workbooks. This has come to the fore, particularly during the COVID-19 pandemic and ensuing lockdown. This paper sets out to analyse and compare the fraction word problem types within the Department of Basic Education workbooks and two of the most used textbooks in Grades 4 to 6, to establish the nature of fraction word problem types. The research question explored was:

What fraction constructs are evident within the fraction word problems in Grades 4 to 6 South African textbooks?

The results show that the part-whole construct is dominant across all the textbooks and there is little progression from one grade to the next in the presentation of each construct. The findings also show that the total number of fraction word problems appears erratic across the Grades 4 to 6 texts. The most fraction word problems across all the texts were in the Grade 5 workbook followed by the Grade 4 workbook. The number of fraction word problems increased from Grades 4 to 6 in Textbook A. This could suggest that word problems are seen as a means of assessing learners' fraction competence after they have been taught the concept. In other words, learners are not introduced to fractions via problem-solving. Textbook B had very few fraction word problems in Grades 4 and 5. In Textbook B, there were fewer word problems in Grade 5 than Grades 4 and 6.

In conclusion, it was seen throughout the three texts that there was no clear progression from Grade 4 to Grade 6 in terms of mastery of one fraction construct before the introduction and focus on the next fraction construct. A developmental progression is needed to build understanding of one fraction construct before moving to the next. The presentation of word problems with reference to fraction constructs can thus be seen as problematic and may be an influencing factor as to why learners struggle with mastering fraction construct skills in fraction word problems.

References

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