

# Developing Pupils' Understanding of Comparing and Ordering Decimal Numbers Using Multiple Representations

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**Abstract.** This study aimed to identify the type of misconceptions pupils made when comparing and ordering decimal numbers among Year 4 pupils in Brunei Darussalam, and to investigate the effect of using multiple representations on developing pupils' understanding of decimals. In addition, the study also examined the different modes of multiple representations teachers used to teach the concepts of comparing and ordering decimal numbers. A combination of quantitative and qualitative methodologies was used to answer the three formulated research questions in this study. The study samples involved twenty-four Year 4 pupils and seventy Year 4 mathematics teachers from the four districts in Brunei Darussalam. Four research instruments were used to collect data which are pre- and post-tests on decimals, pupils' interview, teachers' questionnaire and lesson observations. The pre- and post-tests pupils' written responses and pupils' interviews responses revealed that the pupils experienced misconceptions as they lacked fundamental skills in working with decimal values. In addition, the pupils tended to have limited understanding and knowledge related to decimal concepts.

Results from the pre- and post-tests indicated that the intervention lessons had successfully improved the pupils' overall performance in decimals tasks. The overall performance of the sample pupils showed that there was a significant increase in the achievement from the pre-test as compared to the post-test. This suggests the importance of using multiple representations in teaching decimal concepts to help pupils develop understanding in mathematics and provide meaningful learning experiences. Findings from teachers' questionnaires showed that the instructional materials (i.e. base-ten cards, place value board, decimal grids, number lines and play money ) suggested by the researcher in this study were less frequently used by teachers when teaching the concept of comparing and ordering decimal numbers. This was supported by the findings from classroom observations where teachers used the traditional 'chalk and talk' approach in mathematics lessons by presenting numerous rules and procedures to the class.

In view of the importance of incorporating the use of multiple representations in mathematics curriculum framework, there is a need for continual professional development to equip teachers with relevant skills, content knowledge and pedagogical knowledge to enhance their competency in mathematics.