



Cognitively Guided Proportional Reasoning Instruction

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Abstract

One way to increase teachers pedagogical content knowledge and, as a result, student achievement is through the use of cognitively guided instruction (CGI). A CGI approach to teaching involves assessing students' thinking and using that assessment when determining which problems to pose, types of numbers or contexts to include, and follow-up questions to ask, as well as how to sequence both the overall curriculum and individual lessons. CGI related to arithmetic operations has been extensively studied. In these studies, the researchers first developed a professional development workshop that focused on students' thinking related to a particular set of operations (i.e. addition and subtraction) and then investigated the teachers' use of the knowledge gained from the workshop within their instruction. They found that when teachers' instruction became more cognitively guided, their students' achievement improved.

Here the design of a CGI professional development workshop focused on proportional reasoning will be discussed. Studies have shown that adolescents struggle with proportional reasoning concepts. These difficulties could be due to the fact that teachers frequently do not have strong conceptual understandings of proportion concepts. Moreover, if teachers understand both the subtle (e.g. number structure) and obvious (e.g. context) nuances of proportion word problems, they will have a more accurate depiction of the breadth of the area of proportional reasoning. In addition, if teachers understand the range of strategies that students are likely to use for each problem, they will be better prepared to determine their difficulty.

The results of a study that investigated how teachers changed their proportional reasoning instruction to become more or less cognitively guided will be discussed. All four participants altered their instruction to become more cognitively guided after the workshop. Although, student achievement was not officially investigated within the context of this study, we have reason to believe that these changes would have a positive effect on students' understandings of proportionality.