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Examination of Lower Secondary Mathematics Teachers' Content Knowledge and Its Connection to Students' Performance

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Abstract

© 2015 Ministry of Science and Technology, Taiwan This mixed methods study examined an association between cognitive types of teachers' mathematical content knowledge and students' performance in lower secondary schools (grades 5 through 9). Teachers (N = 90) completed the Teacher Content Knowledge Survey (TCKS), which consisted of items measuring different cognitive types of teacher knowledge. The first cognitive type (T1) assessed participants' knowledge of basic facts and procedures. The second cognitive type (T2) measured teachers' understanding of concepts and connections. The third cognitive type (T3) gauged teachers' knowledge of mathematical models and generalizations. The study comprised two levels of quantitative data analysis. First, we explored each cognitive type of teachers' content knowledge and the overall TCKS score as they related to student performance. Second, we studied the correlation between each cognitive type of teacher content knowledge to deepen the understanding of content associations. Results of the study show a statistically significant correlation between cognitive types T1 and T2 of teacher content knowledge and student performance ($p < .05$). The correlation between cognitive type T3 and student performance was not significant ($p = .0678$). The most substantial finding was the correlation between teachers' total score on the TCKS and student performance (Pearson's $r = .2903$, $p = .0055 < .01$). These results suggest that teachers' content knowledge plays an important role in student performance at the lower secondary school. The qualitative phase included structured interviews with two of the teacher participants in order to further elaborate on the nature of the quantitative results of the study.

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Keywords

Cognitive type of content knowledge, Lower secondary school mathematics, Student performance, Teacher content knowledge