

**An Investigation of Primary School
Teachers' Problem-Solving Beliefs and
Practices in Mathematics Classrooms**

Submitted by

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Statement of Sources

This thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree or diploma.

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All research procedures reported in the thesis received the approval of the relevant Ethics/Safety Committees (where required).

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Abstract

Aims

Problem-solving approaches to teaching mathematics have been recommended in curriculum documents for some time but there is evidence to suggest that there has been limited classroom implementation both in Australia as well as overseas. This investigation explored the level of implementation of mathematical problem solving in primary classrooms in NSW. Teachers' beliefs about the role of problem solving in learning mathematics as well as their classroom practices were also investigated.

To explore what teachers believe and what they do in relation to problem solving, this investigation examined primary school teachers' reported beliefs about the role of problem solving in learning mathematics and their reported practices in classrooms. It aimed to discover how beliefs about mathematical problem solving influenced decision making in teachers' classrooms and what factors promoted and hindered the implementation of problem-solving approaches.

The results of this investigation could provide benefits to several different groups involved in mathematics education. Preservice teacher educators and presenters of inservice education courses could benefit from increased knowledge about the role of beliefs in determining practices as well as potential constraints on desirable practices. Associated with this may be the need to challenge teachers' beliefs that might not support the development of practices that promote problem-solving approaches. For practising teachers, professional development could focus on examining their beliefs and providing the necessary support for teachers to realise the aim of assisting their pupils to achieve problem-solving competence. Curriculum developers may benefit from an increased awareness of the difficulties associated with implementing recommended approaches. Finally, participating teachers may benefit from their involvement in the investigation through opportunities to reflect on their practice while completing the survey instrument as well as during interview discussions with the researcher.

Scope

Data collection focused on teachers' beliefs about mathematics, teaching mathematics and learning mathematics, as well as on their reported practices since all of these factors impact on what occurs in teachers' classrooms. A combination of methods was used to collect data so that there was increased confidence in the research findings. In this way, the results of one method could be tested against another for consistency, thus enhancing trustworthiness and dependability.

The data collection for this investigation was divided into two phases. The first phase involved the use of a questionnaire to seek data on teachers' reported problem-solving beliefs and practices as little is known overall in this area, particularly within the context of Australian teachers. Responses were received from 162 primary school teachers currently teaching in NSW. The instrument was designed with reference to similar instruments that had been used by other researchers in the field and incorporated a combination of closed and open questions.

The second phase of data collection incorporated interviews and observations that were conducted in the field. These methods were used to explore the problem-solving teaching approaches used by a small number of teachers in particular school settings. To collect data about teachers' planning for instruction, and opportunities that support or constrain innovative practices, it was more appropriate to explore particular contexts that would provide a rich set of data.

Conclusions

Analyses of data confirmed the spread of teachers' beliefs, the diversity of their practice, and revealed issues that could hinder their problem-solving efforts in classrooms. A small group of surveyed teachers reported holding *very traditional* views that were quite distinct from another group who reported support for *very contemporary* views. These differences were also apparent in relation to reported classroom practices and appeared to be linked to the current teaching grade level of the respondents. This was confirmed during the interviews and observations as it seems easier for teachers of the lower primary grades to implement practices identified as supporting problem-solving approaches. For teachers of upper primary grades, parents' and school expectations impinge on teachers' practices and potentially constrain their problem-solving efforts. For the two teachers who participated in the classroom observations, considerable energy was required to resist constraints and implement problem-solving approaches.

Recommendations for practice and future research include the need for an examination of constraints on practice, the role of reflective practice in implementing innovative practices, the viability of teaching *through* problem solving as a necessary and important teaching approach, and the use of a variety of problem types in preparing students to be successful problem solvers. In addition, teachers may need to be encouraged to continually reflect on practice and teacher educators may need to raise the awareness of preservice and inservice teachers to the issues involved in implementing problem-solving approaches in their classrooms.