

## Children learning basic facts in mathematics: Can calculators help?

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### Introduction

A number of projects such as the Calculator Aware Number (CAN) Project in Britain and the Victoria Project in Melbourne, as well as many other investigations (Biddulph, 1991; Lindale and Biddulph, 1991) have shown that calculators have the potential to develop children's number sense to a remarkable degree. For example, many children can seem to be able to understand large numbers (into the thousands), negative numbers and decimals even by age seven years. Perhaps this is why *Mathematics in the New Zealand Curriculum* recommends that calculators be an important part of the mathematics programme.

At the same time, however, there is concern expressed by some teachers that calculator use in the classroom will mean that children won't have the same knowledge as previously of basic facts and tables. This is especially the case with teachers who teach at the senior primary level (From 1 and 2) because their students will soon be going to secondary school where a good mastery of basic facts is considered necessary to progress in mathematics and not get left behind. What I wondered was whether this concern could be stood on its head. I wondered whether older children struggling to learn and understand their basic facts could actually be helped to do so through using calculators in special ways. The research outlined below addressed this question.

### Method

This was a two-week qualitative study involving in turn a set of interviews, some small-scale action-research, and a second set of interviews. The subjects were three boys and three girls, aged 11 to 12 years, from a composite Form 1 and 2 class in a relatively small (five-teacher) rural school located in a predominantly middle-class area of South Auckland. All children were European New Zealanders. They were selected by their classroom teacher as having difficulty memorising and implementing their basic facts.

Each child was interviewed individually on both occasions in a quiet location in the school. The purpose of the interviews was to find (i) the strategies the children used when solving basic fact 'problems', and (ii) their understanding of and facility in the four operations. To obtain this kind of information I would ask the children, for example, "How did you get your answer?" or "Can you tell me any other ways of doing the problem?" (Ritchie and Carr, 1992) or "What are you thinking in your

head?” Children’s responses were recorded on interview schedules.

The action-research phase consisted of the children undertaking a ‘calculator-enhanced-unit’ of five sessions, each of approximately one hour, which I developed and taught. The unit was designed to enable the children to (i) investigate ways of using a calculator to rename numbers, (ii) perform basic operations using pencil, paper and calculator, (iii) devise and refine strategies for estimating and checking the reasonableness of addition, subtraction, multiplication and division calculations, (iv) construct and extend mental strategies for doing the four operations, and (v) develop and enhance their understanding of and facility with basic facts through the medium of the calculator. The children were taught in a separate space in the school, such as the staff room, and each had a calculator for her or his exclusive use. I kept notes of the children’s progress throughout the unit.

## Results and Discussion

Although this was a very short study, and given that there may have been a novelty factor associated with the use of calculators, some interesting observations can be reported that may alert teachers to the problems and possibilities associated with introducing calculators at the Form 1 and 2 level to try to help children with their basic facts.

First, it should be noted that, from my prior observations, the children who participated in this research were used to the teacher telling them how to do a problem rather than being given the opportunity to develop and use their own strategies. During the calculator enhanced unit, where they had to work out how to solve problems themselves, they initially responded by becoming frustrated and giving up easily if they weren’t able to solve a problem quickly. I found they needed a lot of encouragement to solve the more difficult problems, and we often ended up solving these as a whole group.

Secondly, gradually there was a decrease in the use of more simple methods of calculating (such as the use of fingers) and an increasing reliance on mental as well as pencil and paper calculation. This suggested that children were gaining greater understanding of and facility with numbers, including knowledge of basic facts.

Thirdly, there was evidence of the children using a greater number of alternative strategies to solve number problems, which showed growing independence on their part. It seemed as if the use of calculators allowed the children to focus on mathematical thinking, particularly thinking about the strategies they could use to solve the problems rather than feeling handicapped by perceptions of inadequacy related to memorisation of basic facts.

## References

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