

INVESTIGATING THE NATURE OF TEACHER KNOWLEDGE
NEEDED AND USED IN TEACHING STATISTICS

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ABSTRACT

This thesis explores the knowledge needed for teaching statistics through investigations at the primary (elementary) school level. Statistics has a relatively short history in the primary school curriculum, compared with mathematics. Recent research in statistics education has prompted a worldwide move away from the teaching of statistical skills, towards a broader underpinning of statistical thinking and reasoning. New Zealand's nationally mandated curriculum reflects this move. Consequently, little is known about the types of knowledge needed to teach statistics effectively. Ideas from two contemporary areas of research, namely teacher content knowledge in relation to mathematics, and statistical thinking, are incorporated into a new framework, for exploring knowledge for teaching statistics.

The study's methodological approach is based on Popper's philosophy of realism, and the associated logic of learning approach for classroom research. Four primary teachers (in their second year of teaching) planned and taught a sequence of four or five lessons, which were videotaped. Following each lesson, a stimulated recall interview, using an edited video of the lesson, was conducted with the teacher.

The video and interview recordings were analysed in relation to the teacher knowledge and statistical thinking framework. The results provide detailed descriptions of the components of teacher knowledge in relation to statistical thinking that are needed and used in the classroom. Included in the results are profiles of each teacher's knowledge. These profiles describe 'missed opportunities', which were defined as classroom incidents in which teacher knowledge was needed but not used, and consequently resulted in the teachers not taking advantage of chances to enhance students' learning.

A number of significant themes were revealed, linked to knowledge for teaching statistics. The themes include: problems associated with teacher listening; the need for the teacher to be familiar with the data; students' difficulties with various components of the statistical investigation cycle; and understanding variation and the development of inference.

The study concludes that for effective teaching of statistics through investigations, it is necessary for teachers to have knowledge in each of four categories as related to each component of statistical thinking. If any aspect of knowledge is not available or not used, teachers will not enhance, and could disadvantage, students' learning. Implications from the findings are considered for initial and on-going teacher education.