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

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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.
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# TABLE OF CONTENTS

## CHAPTER 1 INTRODUCTION ........................................................................................................1

1.1 Broad aim of this research ........................................................................................................1
1.2 Background and rationale .........................................................................................................1
   1.2.1 Statistics in the curriculum ..............................................................................................1
   1.2.2 Teacher knowledge .........................................................................................................3
1.3 Research hypothesis and questions ..........................................................................................6
   1.3.1 Hypothesis ......................................................................................................................6
   1.3.2 Questions .........................................................................................................................6
1.4 Overview of this thesis ............................................................................................................6
1.5 Usage of terms ........................................................................................................................8

## CHAPTER 2 LITERATURE REVIEW ..........................................................................................9

2.1 Introduction ...........................................................................................................................9
2.2 Knowledge bases for teaching ...............................................................................................9
   2.2.1 Subject matter knowledge ..............................................................................................14
   2.2.2 How does teacher knowledge develop? ..........................................................................16
   2.2.3 Teacher knowledge and teaching ....................................................................................17
2.3 Researching teacher knowledge in the classroom .................................................................20
   2.3.1 Introduction ....................................................................................................................20
   2.3.2 Impact of ‘teacher talk’ on classroom discourse ............................................................21
   2.3.3 Impact of teacher listening on classroom discourse ......................................................22
2.4 Summary of teacher knowledge research .............................................................................24
2.5 Teaching and learning statistics ............................................................................................24
   2.5.1 Statistics as a strand of mathematics: Tensions ...............................................................24
   2.5.2 Statistical literacy, reasoning, and thinking .................................................................25
   2.5.3 Teaching of statistics for conceptual understanding ......................................................27
   2.5.4 Frameworks and models for knowledge of statistics ....................................................29
   2.5.5 Summary of teaching and learning statistics .................................................................32
2.6 A framework for investigating teacher knowledge in statistics .........................................33

## CHAPTER 3 METHODOLOGY IN THEORY ............................................................................37

3.1 Introduction ..........................................................................................................................37
3.2 What is knowledge and how does it grow? ...........................................................................37
3.3 Popper and how knowledge develops ....................................................................................38
3.4 Catering for the dynamic nature of knowledge ....................................................................41
3.5 Researching knowledge .......................................................................................................43
   3.5.1 Empirical-analytic research paradigm? .........................................................................44
   3.5.2 Interpretive or symbolic research paradigm? .................................................................45
CHAPTER 6 DISCUSSION: SIGNIFICANT THEMES ................................................................. 107

6.1 INTRODUCTION........................................................................................................... 107
6.2 TEACHER LISTENING TO AND INTERPRETING STUDENTS’ STATEMENTS .............. 107
  6.2.1 Teacher responds to a different question or statement from the one asked .......... 108
  6.2.2 Teacher does not evaluate a student’s answer ..................................................... 112
  6.2.3 Teacher seeks no further clarification ................................................................. 118
  6.2.4 Summary of teacher listening and interpreting .................................................. 121
6.3 TEACHER FAMILIARITY WITH THE DATA ............................................................ 122
6.4 POsing QUESTIONS FOR INVESTIGATION ............................................................. 124
6.5 STUDENTS’ HANDLING OF CATEGORY AND NUMERIC DATA ........................... 130
6.6 SORTING DATA: MOVING FROM NOTICING INDIVIDUAL DATA TO GROUP FEATURES AND RELATIONSHIPS ......................................................................................... 132
  6.6.1 Focus on individual data ....................................................................................... 132
  6.6.2 Sorting by one variable ....................................................................................... 135
  6.6.3 Sorting by more than one variable to look at relationships ................................. 136
6.7 STUDENTS’ DIFFICULTY WITH DATA-BASED STATEMENTS .............................. 141
  6.7.1 Introduction ......................................................................................................... 141
  6.7.2 Describing groups or comparing groups? ............................................................ 142
  6.7.3 Comparative statements ..................................................................................... 144
  6.7.4 Teachers’ strategies for assisting ......................................................................... 145
6.8 UNDERSTANDING VARIATION AND THE DEVELOPMENT OF INFERENCES .......... 153
6.9 SUMMARY .................................................................................................................. 159

CHAPTER 7 CONCLUSIONS AND IMPLICATIONS .......................................................... 161

7.1 INTRODUCTION.......................................................................................................... 161
7.2 RESEARCH HYPOTHESIS AND QUESTIONS ......................................................... 162
  7.2.1 Question 1 .......................................................................................................... 163
  7.2.2 Question 2 .......................................................................................................... 165
  7.2.3 Question 3 .......................................................................................................... 169
  7.2.4 Question 4 .......................................................................................................... 180
  7.2.5 Hypothesis ......................................................................................................... 182
7.3 CONTRIBUTION ......................................................................................................... 184
7.4 LIMITATIONS ............................................................................................................ 185
7.5 IMPLICATIONS AND FURTHER RESEARCH ....................................................... 186
7.6 FINAL WORD ............................................................................................................ 188

REFERENCES ................................................................................................................. 189

APPENDIX 1 INFORMATION SHEETS AND CONSENT FORMS ................................. 197

INFORMATION SHEET – PRINCIPAL/BOARD OF TRUSTEES AND TEACHER ............ 198
CONSENT FORM - TEACHER ....................................................................................... 200
INFORMATION SHEET – PARENTS/CAREGIVERS ................................................................. 201
INFORMATION SHEET - STUDENTS .................................................................................. 203
CONSENT FORM FOR STUDENT AND PARENT(S)/CAREGIVER(S) .................................. 205

APPENDIX 2 UNIT PLAN ........................................................................................................ 207

2.1 INTRODUCTION .......................................................................................................... 207
2.2 UNIT PLAN ................................................................................................................. 208

APPENDIX 3 DATA DETECTIVE POSTER ......................................................................... 217

APPENDIX 4 SAMPLE TRANSCRIPTS AND NOTES FROM ANNOTAPE .......................... 219

EXPLANATION ..................................................................................................................... 219
TITLE: SCH1LESSON4E.mov ............................................................................................. 220
TITLE: SCH1LESSON4INT.aif ............................................................................................. 223
TITLE: SCH2LESSON2.mov ............................................................................................. 229
TITLE: SCH2LESSON2&3INT.mp3 ..................................................................................... 233
TITLE: SCH3LESSON2E.mov ............................................................................................. 237
TITLE: SCH3LESSON2INT.mp3 ........................................................................................... 242
TITLE: SCH4LESSON2E.mov ............................................................................................. 245
TITLE: SCH4LESSON2INT.mp3 ........................................................................................... 249
LIST OF TABLES

TABLE 2-1: COMPONENTS OF TEACHER KNOWLEDGE IN RELATION TO STATISTICAL THINKING AND INVESTIGATING .................................................................................................................. 34

TABLE 4-1: LENGTHS OF EDITED VIDEOS AND INTERVIEWS, BY SCHOOL AND LESSON NUMBERS ........ 62

TABLE 5-1: COMPONENTS OF TEACHER KNOWLEDGE IN RELATION TO STATISTICAL THINKING AND INVESTIGATING ........................................................................................................ 67

TABLE 5-2: SUMMARY OF LINDA’S TEACHER KNOWLEDGE .................................................................. 87

TABLE 5-3: SUMMARY OF JOHN’S TEACHER KNOWLEDGE ................................................................. 91

TABLE 5-4: TWO-WAY TABLE SHOWING THE DATA RELATED TO THE QUESTION POSED BY JOHN ABOUT PROPORTIONS OF WHISTLING RIGHT HANDERS AND WHISTLING LEFT HANDERS ........ 92

TABLE 5-5: SUMMARY OF ROB’S TEACHER KNOWLEDGE ............................................................... 96

TABLE 5-6: SUMMARY OF LOUISE’S TEACHER KNOWLEDGE ................................................................. 101

TABLE 6-1: TWO-WAY TABLE SHOWING THE DATA RELATED TO THE QUESTION POSED BY JOHN ABOUT PROPORTIONS OF WHISTLING RIGHT HANDERS AND WHISTLING LEFT HANDERS .......... 113

TABLE 6-2: NUMBERS OF STUDENTS BY GENDER AND WHISTLING VS. HANDEDNESS (AND POSITION IN FAMILY FOR THE RIGHT HANDED STUDENTS) ........................................................................... 115
List of Figures

FIGURE 3-1: POPPER’S SCHEMA OF THE GROWTH OF PUBLIC KNOWLEDGE ..................................................39
FIGURE 5-1: EXAMPLE OF DATA CARD FROM THREE DATA SETS .................................................................66
FIGURE 5-2: DIAGRAM DRAWN BY LINDA TO HELP STUDENTS MAKE SENSE OF THE STATEMENT FROM R
AND J.........................................................................................................................................................75
FIGURE 6-1: RECORD ON WHITEBOARD FOLLOWING DISCUSSION OF 'RANGE'. ......................................109
FIGURE 6-2: A REPRODUCTION OF JOHN’S DIAGRAM OF ARROWS ON THE DATA CARD, FOR ASSISTING
STUDENTS WITH RELATIONSHIPS .............................................................................................................138
FIGURE 6-3: LOUISE’S DIAGRAM OF HOW TO SORT USING TWO VARIABLES ..............................................141
FIGURE 6-4: LINDA’S TWO-WAY TABLE OF THE DATA FOR GENDER (B/G) VS. MOVIE PREFERENCE
(M=MADAGASCAR/IA2=ICE AGE 2) ........................................................................................................147
FIGURE 6-5: LINDA’S TWO-WAY TABLE OF GENDER/FAVOURITE SPORTS-STAR..............................149
FIGURE 7-1: PROFILES OF THE FOUR TEACHERS .......................................................................................172