UNIVERSITY OF CANBERRA
DIVISION OF COMMUNICATION AND EDUCATION

THE DEVELOPMENT OF ENHANCED INFORMATION RETRIEVAL STRATEGIES IN UNDERGRADUATES THROUGH THE APPLICATION OF LEARNING THEORY: AN EXPERIMENTAL STUDY

by

KAREN MACPHERSON

A thesis submitted in fulfilment of the requirements for a Doctoral Degree at the University of Canberra

VOLUME I

September 2002

Primary Supervisor:
Professor Belle Alderman
Head, School of Information Management & Tourism
Division of Communication and Education
ABSTRACT

In this thesis, teaching and learning issues involved in end-user information retrieval from electronic databases are examined. A two-stage model of the information retrieval process, based on information processing theory, is proposed; and a framework for the teaching of information literacy is developed.

The efficacy of cognitive psychology as a theoretical framework that enhances the understanding of a number of information retrieval issues, is discussed. These issues include: teaching strategies that can assist the development of conceptual knowledge of the information retrieval process; individual differences affecting information retrieval performance, particularly problem-solving ability; and expert and novice differences in search performance.

The researcher investigated the impact of concept-based instruction on the development of information retrieval skills through the use of a two-stage experimental study conducted with undergraduates students at the University of Canberra, Australia. Phase 1 was conducted with 254 first-year undergraduates in 1997, with a 40 minute concept-based teaching module as the independent variable. A number of research questions were proposed:

1. Will type of instruction influence acquisition of knowledge of electronic database searching?
2. Will type of instruction influence information retrieval effectiveness?
3. Are problem-solving ability and information retrieval effectiveness related?
4. Are problem-solving ability and cognitive maturity related?
5. Are there any differences in the search behaviour of more effective and less effective searchers?

Subjects completed a pre-test which measured knowledge of electronic databases, and problem-solving ability; and a post-test that measured changes
in these abilities. Subjects in the experimental treatment were taught the 40
minute concept-based module, which incorporated teaching strategies
grounded in learning theory. The strategies included: the use of analogy;
modelling; and the introduction of complexity. The aims of the module were
to foster the development of a realistic concept of the information retrieval
process; and to provide a problem-solving heuristic to guide subjects in their
search strategy formulation. All subjects completed two post-tests: a survey
that measured knowledge of search terminology and strategies; and an
information retrieval assignment that measured effectiveness of search design
and execution.

Results suggested that using a concept-based approach is significantly more
effective than using a traditional, skills-demonstration approach in the
teaching of information retrieval. This effectiveness was both in terms of
increasing knowledge of the search process; and in terms of improving search
outcomes. Further, results suggested that search strategy formulation is
significantly correlated with electronic database knowledge, and problem-
solving ability; and that problem-solving ability and level of cognitive
maturity may be related.

Results supported the two-stage model of the information retrieval process
suggested by the researcher as one possible construct of the thinking
processes underlying information retrieval.

These findings led to the implementation of Phase 2 of the research in 1999.
Subjects were 68 second-year undergraduate students at the University of
Canberra. In this Phase, concept-based teaching techniques were used to
develop four modules covering a range of information literacy skills,
including: critical thinking; information retrieval strategies; evaluation of
sources; and determining relevance of articles. Results confirmed that subjects
taught by methods based on learning theory paradigms (the experimental
treatment group), were better able to design effective searches than subjects
who did not receive such instruction (the control treatment group). Further,
results suggested that these teaching methods encouraged experimental
group subjects to locate material from more credible sources than did control
group subjects.

These findings are of particular significance, given the increasing use of the
unregulated internet environment as an information source.

Taking into account literature reviewed, and the results of Phases 1 and 2, a
model of the information retrieval process is proposed.

Finally, recognising the central importance of the acquisition of information
literacy to student success at university, and to productive membership of the
information society, a detailed framework for the teaching of information
literacy in higher education is suggested.
# TABLE OF CONTENTS

## VOLUME I

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERTIFICATE OF ORIGINALITY OF THESIS</td>
<td>i</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>ii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xvii</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xix</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>xx</td>
</tr>
</tbody>
</table>

1. **INTRODUCTION** ........................................................................................................ 1
   1.1 Purpose of the Study ...................................................................................... 1
   1.2 Background to the Study ............................................................................... 3
   1.3 Definitions ....................................................................................................... 5

2. **SIGNIFICANCE OF THE STUDY** ............................................................................... 9
   2.1 Introduction ..................................................................................................... 9
   2.2 The Rise of Information Literacy, and Critical Thinking
      Rediscovered .................................................................................................. 11
   2.3 Information Literacy in Higher Education .................................................. 14

3. **LITERATURE REVIEW - INFORMATION RETRIEVAL** .............................................. 20
   3.1 Characterising Information Retrieval ........................................................... 20
      3.1.1 Search Strategies and Search Terms ....................................................... 20
      3.1.2 Expectations of Novice Searchers .......................................................... 24
      3.1.3 The Nature of Expert Searching .................................................................. 28
      3.1.4 Individual Differences ............................................................................ 31
      3.1.5 Issues in Information Retrieval – Summary .......................................... 35
   3.2 Models of Information Retrieval ........................................................................ 36
      3.2.1 Borgman .................................................................................................... 37
      3.2.2 Kuhlthau .................................................................................................. 38
      3.2.3 Bates ........................................................................................................ 39
      3.2.4 Marchionini .............................................................................................. 40
      3.2.5 Spink ........................................................................................................ 40
      3.2.6 Wilson ...................................................................................................... 41
      3.2.7 Limberg .................................................................................................... 41

Table of Contents
3.3 Teaching Information Retrieval ........................................... 43
   3.3.1 Concept-based Teaching ........................................... 43
   3.3.2 The Role of Problem-solving Heuristics ......................... 47
   3.3.3 Course-integrated Instruction .................................... 49

3.4 Methodologies in Information Retrieval Research ................. 50

3.5 Conclusion ........................................................................ 52

4. COGNITIVE PSYCHOLOGY - A REVIEW .................................. 55
   4.1 Information Processing .................................................. 56
      4.1.1 Knowledge Representation ....................................... 57
      4.1.2 Information Processing Model .................................. 64
      4.1.3 Information Processing and Problem Solving ................. 64
   4.2 Learning Theory .......................................................... 66
      4.2.1 Transforming Mental Models ..................................... 67
      4.2.2 Cognitive Flexibility Theory ..................................... 68
      4.2.3 Situated Cognition .................................................. 69
   4.3 Developmental Theory ................................................... 71
      4.3.1 Piaget ................................................................. 73
      4.3.2 Perry ................................................................. 75
   4.4 Conclusion ...................................................................... 77

5. THEORETICAL FRAMEWORK .............................................. 79
   5.1 Introduction .................................................................... 79
   5.2 The Search Process and Information Processing Models ........ 79
   5.3 Type of Instruction ....................................................... 85
   5.4 Thinking Processes ....................................................... 87
   5.5 Framework for the Teaching of Information Literacy .......... 88
   5.6 Phase 1 Research Questions and Hypotheses ..................... 88
      5.6.1 Research Question 1 ................................................ 89
      5.6.2 Research Question 2 ................................................ 90
      5.6.3 Research Question 3 ................................................ 91
6. METHOD ...........................................................................................................95

6.1 Introduction ....................................................................................................95
   6.1.1 Ethics ........................................................................................................95
   6.1.2 Assumptions ..............................................................................................97
   6.1.3 Research Method .......................................................................................98

6.2 The Study - Phase 1 .......................................................................................99
   6.2.1 Research Design .....................................................................................100
   6.2.2 Population and Sample .........................................................................100
   6.2.3 Variables ................................................................................................104
   6.2.4 Timetable for Conduct of the Experiment ..............................................107
   6.2.5 Data Collection .......................................................................................109
   6.2.6 Limitations ...............................................................................................110

6.3 Instruments .....................................................................................................113
   6.3.1 Survey 1 ..................................................................................................114
   6.3.2 Survey 2 ..................................................................................................123
   6.3.3 Information Retrieval Assignment ..........................................................125
   6.3.4 The Module ............................................................................................128

6.4 Measurement: Relevance .............................................................................135

6.5 Data Analysis .................................................................................................141

7. PHASE 1 - RESULTS .......................................................................................142

7.1 Background Variables ..................................................................................142
   7.1.1 Participants - Response Rates ...............................................................142
   7.1.2 Descriptive Statistics: Surveys 1 and 2 ..................................................143
   7.1.3 Characteristics of Sample .....................................................................147

7.2 Hypotheses .....................................................................................................154
   7.2.1 Research Question 1 .............................................................................155
   7.2.2 Research Question 2 .............................................................................157
   7.2.3 Research Question 3 .............................................................................188

7.3 Other Correlates .............................................................................................198
   7.3.1 Research Question 4 .............................................................................198
7.3.2 Research Question 5 ................................................................. 202
7.3.3 Electronic Database Knowledge and Other Intervening Variables ......................................................... 204
7.3.4 Problem Solving and Intervening Variables ......................................................................................... 208

7.4 Summary of Results ......................................................................................................................... 220

8. PHASE 1 - DISCUSSION ................................................................................................................. 222
8.1 Theoretical Framework - Review ............................................................ 222
8.2 Central Research Questions ............................................................................. 224
  8.2.1 Research Question 1 .............................................................................. 224
  8.2.2 Research Question 2 .............................................................................. 225
  8.2.3 Research Question 3 .............................................................................. 234
8.3 Other Correlates .............................................................................................. 236
  8.3.1 Research Question 4 .............................................................................. 236
  8.3.2 Research Question 5 .............................................................................. 238
  8.3.3 Problem Solving Ability of Participants ................................................ 239
  8.3.4 Profile of Australian Undergraduate Students' Computer Literacy .......... 243
8.4 Conclusions ........................................................................................................... 245

VOLUME II

9. PHASE 2 - METHOD .................................................................................................................... 251
9.1 Introduction ................................................................................................. 251
9.2 Research Questions and Hypotheses ......................................................... 252
  9.2.1 Research Question 1 .............................................................................. 252
  9.2.2 Research Question 2 .............................................................................. 254
  9.2.3 Research Question 3 .............................................................................. 254
9.3 The Study ........................................................................................................ 255
  9.3.1 Research Design ...................................................................................... 257
  9.3.2 Population and Sample ............................................................................ 258
  9.3.3 Variables ................................................................................................ 261
  9.3.4 Timetable for Conduct of Experiment .................................................. 265
  9.3.5 Data Collection ........................................................................................ 267
  9.3.6 Limitations ................................................................................................ 268
9.4 Instruments ...................................................................................................... 272
  9.4.1 Survey 1 .................................................................................................. 272
  9.4.2 Survey 2 .................................................................................................. 277
  9.4.3 Literature Search Assignment .............................................................. 278
12. CONCLUSIONS........................................................................................................ 353
12.1 Concept-based Teaching: is it Effective? .............................................. 353
12.2 A Model of Information Retrieval .......................................................... 356
12.3 A Framework for the Teaching of Information Literacy ............. 367
12.4 Further Research .................................................................................. 374
12.5 Conclusion ......................................................................................... 376

BIBLIOGRAPHY .................................................................................................... 380

APPENDICES ......................................................................................................... 399
LIST OF TABLES

CHAPTER 3
Table 3-1 Individual Differences Affecting Search Ability ...............32

CHAPTER 4
Table 4-1 Areas of Study within Psychology .............................56
Table 4-2 Thinking Strategies and Piagetian Developmental Levels ..................................................74

CHAPTER 6
Table 6-1 Summary of Hypotheses (Null Form) and Instruments of Measurement ........................................99
Table 6-2 Experimental Design for Phase 1 ...............................100
Table 6-3 Communication Interface 1, First Semester 1997 - Statistics ..........................................................103
Table 6-4 Timetable for Conduct of Experiment .........................108
Table 6-5 Thinking Skills Tested in Survey 1, Section 3 ..........121
Table 6-6 Rating Criteria for Information Retrieval Assignment...138

CHAPTER 7
Table 7-1 Descriptive Statistics for Electronic Database and Problem-Solving Knowledge Measures: Total Sample...143
Table 7-2 Descriptive Statistics for Electronic Database and Problem-Solving Knowledge Measures: Survey 2 ....145
Table 7-3 Gender ......................................................................147
Table 7-4 Age ..........................................................................147
Table 7-5 Education .................................................................148
Table 7-6 Status ........................................................................149
Table 7-7 Faculty of Study .........................................................149
Table 7-8 Computer Access ......................................................150
Table 7-9 Computer Ability .............................................. 150
Table 7-10 Computer Enjoyment ........................................ 151
Table 7-11 Use of Electronic Databases .............................. 151
Table 7-12 Completion of Library Tours .............................. 152
Table 7-13 Summary of Hypotheses (Null Form) and
Instruments .................................................................... 155
Table 7-14 Descriptive Statistics for Variables Determined by
Frequency, by Topic ...................................................... 160
Table 7-15 Descriptive Statistics for Variables Determined by
Frequency – All Search Topics Combined ......................... 161
Table 7-16 Significant Differences between Experimental and
Control Groups on Variables Determined by
Frequency .................................................................. 162
Table 7-17 Descriptive Statistics for Search Strategy Variables
Measured on Nominal and Ordinal Scales ......................... 166
Table 7-18 Topic 1: Use of Truncation as a Function of Treatment.. 167
Table 7-19 Topic 2: Use of Truncation as a Function of Treatment.. 168
Table 7-20 Topic 3: Use of Truncation as a Function of Treatment.. 169
Table 7-21 Correct Use of Truncation as a Function of Treatment
Combined ................................................................. 171
Table 7-22 Mixed Use of Truncation as a Function of Treatment .... 172
Table 7-23 Incorrect Use of Truncation as a Function of Treatment 173
Table 7-24 Truncation Not Used as a Function of Treatment........... 173
Table 7-25 Topic 1: Use of Boolean Operators as a Function of
Treatment ................................................................ 174
Table 7-26 Topic 2: Use of Boolean Operators as a Function of
Treatment ................................................................ 175
Table 7-27 Topic 3: Use of Boolean Operators as a Function of
Treatment ................................................................ 175

Table of Contents
### Table 7-28
Topic 1: Suitability of Search Strategy as a Function of Treatment ...................................................... 177

### Table 7-29
Topic 2: Suitability of Search Strategy as a Function of Treatment ...................................................... 177

### Table 7-30
Topic 3: Suitability of Search Strategy as a Function of Treatment ...................................................... 177

### Table 7-31
Topics 1, 2 and 3 Combined: Suitability of Search Strategy as a Function of Treatment ....................... 178

### Table 7-32
Topic 1: Search Success as a Function of Treatment .......... 179

### Table 7-33
Topic 2: Search Success as a Function of Treatment .......... 180

### Table 7-34
Topic 3: Search Success as a Function of Treatment .......... 180

### Table 7-35
Topic 1: Participant Self-evaluation of Search Success as a Function of Treatment ................................ 182

### Table 7-36
Topic 2: Participant Self-evaluation of Search Success as a Function of Treatment ................................ 183

### Table 7-37
Topic 3: Participant Self-evaluation of Search Success as a Function of Treatment ................................ 184

### Table 7-38
Significant Differences between Experimental and Control Groups for Each Search Topic ...................... 186

### Table 7-39
Problem Solving: Log Cross Product Summary .................. 189

### Table 7-40
Log Cross Ratio Calculation: Problem-Solving Ability And Electronic Database Knowledge .................... 191

### Table 7-41
Variables Determined by Frequency: Experimental And Control Group Means ..................................... 194

### Table 7-42
Variables Determined by Frequency: Problem Solving Above and Below Mean on Pre-test ...................... 196

### Table 7-43
Summary of Differences on Variables Measuring Information Retrieval Effectiveness as a Function of Treatment, and of Problem-Solving Score ........................................... 197

### Table 7-44
Complex and Dualistic Answers to Survey 1, Section 4: Questions 1, 2 and 3 ........................................ 199
Table 7-45  Total Number of "Complex" and "Dualistic" Answers for Survey 1, Section 4 ........................................ 200
Table 7-46  Electronic Database Use and Number of Reformulations for Each Search Topic ......................... 203
Table 7-47  Summary of Means for Age, Gender, Highest Academic Qualification and Faculty of Study on Problem-Solving Questions ........................................... 210
Table 7-48  Problem-Solving Questions Ranked in Expected Order of Difficulty from Most Difficult to Least Difficult .................................................................................. 212
Table 7-49  Sub-category First Rankings on Problem-Solving Questions ...................................................... 218
Table 7-50  Phase 1 - Summary of Results .................................................................................. 221

CHAPTER 8
Table 8-1  Significant differences between experimental and control groups for each search topic .................. 226

CHAPTER 9
Table 9-1  Summary of Hypotheses (Null Form) and Instruments .................................................. 257
Table 9-2  Phase 2 - Experimental Design ................................................................................ 258
Table 9-3  Office Management 3 Statistics ................................................................................. 261
Table 9-4  Phase 2 - Timetable for Conduct of Experiment ....................................................... 266
Table 9-5  Theoretical Underpinning of Survey Questions - Section 3 ........................................... 277
Table 9-6  Timetable for Delivery of Modules ......................................................................... 284
CHAPTER 10

Table 10-1  Gender ................................................................. 294
Table 10-2  Age .................................................................... 295
Table 10-3  Education ........................................................... 295
Table 10-4  Use of Electronic Databases ................................. 296
Table 10-5  Completion of Library Tours ................................. 297
Table 10-6  Hypotheses (Null Form) and Instruments of
Measurement ..................................................................... 302
Table 10-7  Descriptive Statistics for Search Strategy Variables
by Topic ............................................................................. 308
Table 10-8  Differences in Means between Experimental and
Control Groups for Variables Determined by Frequency ...309
Table 10-9  Significant Differences between Experimental and
Control Groups on Variables Determined by Frequency ...310
Table 10-10 Search Strategy Variables Measured on Nominal and
Ordinal Scales ................................................................. 312
Table 10-11 Topics 1 and 2: Use of Truncation as a Function of
Treatment .................................................................... 312
Table 10-12 Topics 1 and 2: Use of Complex Boolean Operators
as a Function of Treatment ................................................ 314
Table 10-13 Topics 1 and 2: Suitability of Search Strategy as a
Function of Treatment .................................................... 315
Table 10-14 Topics 1 and 2: Total Number of Credible Sources
Used, as a Function of Treatment ....................................... 319
Table 10-15 Topics 1 and 2: “Highly Relevant” Articles ............ 320
Table 10-16 Topics 1 and 2: “Marginally Relevant” Articles ....... 322
Table 10-17 Topics 1 and 2: Articles “Not Relevant” to Search Topics ..323
Table 10-18 Experimental and Control Group Means on
Variables Determined by Frequency Measuring Search
Strategy Formulation, and Search Outcome .................... 327
Table 10-19 Problem Solving Means on Variables Determined by
Frequency Measuring Search Strategy Formulation and
Search Outcome ............................................................ 328
CHAPTER 11

Table 11-1  Correlates - Phase 1 and Phase 2 Comparison .....................344
Table 11-2  Significant Differences between Experimental and Control Groups for Phases 1 and 2 .....................348
LIST OF FIGURES

CHAPTER 5

Figure 5-1 Information Retrieval - Stage 1: Neural Network Model of Question Interpretation.........................82

Figure 5-2 Information Retrieval - Stage 2: Information Processing Model of Conducting a Search.......................84

CHAPTER 7

Figure 7-1 Scores on Survey 1, Section 2: Electronic Database Knowledge Questions - Total Sample......................144

Figure 7-2 Scores on Survey 1, Section 3: Problem-Solving Questions - Total Sample ..................................145

Figure 7-3 Scores on Survey 2, Section 2: Electronic Database Knowledge..................................................146

Figure 7-4 Scores on Survey 2, Section 3: Problem-Solving Questions ..........................................................146

Figure 7-5 Boxplot showing Relationship between Gender, EDB Use and EDB Knowledge..........................206

Figure 7-6 Percentage Incorrect Responses by Age, for Questions 1-9 (Survey 1, 1997) .................................215

Figure 7-7 Percentage Incorrect Responses by Gender, for Questions 1-0 (Survey 1, 1997) .................................216

Figure 7-8 Percentage Incorrect Responses by Highest Academic Qualification for Questions 1-9 (Survey 1, 1997) .................................................................217

Figure 7-9 Percentage Incorrect Responses by Faculty on Survey 2, 1997 ..................................................220
CHAPTER 10

Figure 10-1  Scores on Electronic Database Knowledge Questions - Total Sample ........................................... 299
Figure 10-2  Scores on Problem-Solving Questions -
            Total Sample .................................................. 300
Figure 10-3  Scores on Survey 2, Electronic Database
            Questions - Total Sample .................................... 301
Figure 10-4  Scores on Electronic Database Knowledge
            Pre-test as a Function of Treatment .......................... 304
Figure 10-5  Scores on Electronic Database Knowledge
            Post-test as a Function of Treatment ........................ 305
Figure 10-6  Percentage of Incorrect Responses as a
            Function of Age for Seven Most Difficult
            Questions .......................................................... 336
Figure 10-7  Percentage of Incorrect Responses as a
            Function of Gender for Seven Most
            Difficult Questions ............................................. 337
Figure 10-8  Percentage of Incorrect Responses as a
            Function of Highest Academic Qualification for
            Seven Most Difficult Questions ............................. 338
Figure 10-9  Topics 1 and 2 Combined: Time Taken to
            Find Literature as a Function of Treatment .............. 347

CHAPTER 12

Figure 12-1  Information Retrieval - Stage 1: Neural Network
            Model of Question Interpretation ............................. 360
Figure 12-2  Information Retrieval - Stage 2: Information
            Processing Model of Conducting a Search .................. 364
Figure 12-3  A Model of Information Retrieval ....................... 366
Figure 12-4  A Framework for the Teaching of Information
            Literacy .......................................................... 369
Figure 12-5  Framework and Content for the Teaching of
            Information Literacy .......................................... 370

Table of Contents  . xviii
LIST OF APPENDICES

Appendix 1 Phase 1 Informed Consent ........................................... 399
Appendix 2 Phase 2 Informed Consent ........................................... 400
Appendix 3 Phase 1 Survey 1 (pre-test) ........................................... 401
Appendix 4 Phase 1 Information Retrieval Assignment
(post-test 2) ................................................................. 409
Appendix 5 Phase 1 Survey 2 (post-test 1) ........................................... 412
Appendix 6 Phase 1 Experimental Teaching Module ................. 416
Appendix 7 Phase 1 Library Liaison Officer's Information
Retrieval Demonstration .................................................. 419
Appendix 8 Phase 1 Search Worksheet ........................................... 425
Appendix 9 Phase 1 Handout for Control Group on Information
Retrieval Strategies ......................................................... 426
Appendix 10 Phase 1 Rating Sheet for Information Retrieval
Assignment ............................................................... 432
Appendix 11 Phase 2 Survey 2 (post-test 1) ........................................... 433
Appendix 12 Phase 2 Literature Search Assignment (post-test 2) ... 437
Appendix 13 Phase 2 Survey 1 (pre-test) ........................................... 440
Appendix 14 Phase 2 Module: Experimental Treatment, Week 6 .... 448
Appendix 15 Phase 2 Module: Control Treatment, Week 6 ......... 453
Appendix 16 Phase 2 Literature Search Assignment Worksheet ......... 455
Appendix 17 Phase 2 Module: Experimental Treatment, Week 4 .... 456
Appendix 18 Phase 2 Rating Sheet for Literature Search
Assignment ............................................................... 459
ACKNOWLEDGEMENTS

A major piece of work, spanning a number of years, is not conducted in a vacuum. It is shaped directly or indirectly, and to a greater or lesser extent, by influences acting on the author – both positive and negative.

In the present case, only one negative influence was a constant in the thesis equation: time. Time to read; to think; to execute the experiments; to write. My ability to overcome that negative influence has been only with the help of the people who are mentioned below.

All other influences, from the genesis to the completion of this thesis, have been overwhelmingly positive. My heartfelt thanks are extended to three groups of people - to my colleagues at the University of Canberra; to Mum and Dad, family and friends; and to my supervisors - these people have at all times been supportive and encouraging. I am grateful also to the various statistical consultants at the University of Canberra who have provided advice on issues statistic; to the lecturers who allowed me access to their students; and to the many students themselves, who participated cheerfully in the research process.

I would like to thank Associate Professor Peter Clayton, whose counsel influenced not only my decision to enrol in a Masters degree, but also to upgrade to a PhD several years later. Peter’s characteristically incisive comments on various drafts of the work have always been constructive. My primary supervisor, Professor Belle Alderman, has throughout the process provided much-appreciated support and guidance; suggesting directions to be considered, providing cogent comments on drafts, and even energetically and successfully negotiating a number of administrative obstacles on my behalf. I have learned much of value, from both of you.

Finally – thank you Mum – not only for your practical support with my children when I was desperate to get some work done, but also for just plain caring whether I ever finished or not.

I would like to dedicate this thesis to my beautiful daughters, Alex and Kath – with the gratuitous advice – never, ever, give up!