

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Awareness of Learning in the Mathematics Classroom

A thesis submitted as partial fulfilment of
the requirements for the degree of
Master of Educational Studies (Mathematics)
Massey University
Palmerston North New Zealand

Eleanor Bourke
1999

ABSTRACT

The thesis reports on a teacher research project, involving a Form 3 class in a New Zealand secondary school. The study considers the importance of metacognitive behaviours in developing students' awareness of learning in mathematics. It focuses on the teacher in the classroom emphasising awareness of learning with students.

The theoretical basis of the New Zealand Mathematics curriculum, that is, constructivism and its corollary active learning, provides the impetus for the study. Classroom activities, both routine and those specifically tailored for such an investigation, are trialled. In the process, shifts and developments in the students' and teacher's knowledge and beliefs, are documented. Methods of teaching are explored and evaluated in the move towards constructivist teaching practice.

Although teacher research is a relatively new and accepted methodology, it derives from Dewey (1933) and Schon's (1983) work on reflective practice. Using the more established action research methodology as a scaffold this thesis found the open teacher research style suited the sole researcher nature of this work. Within the process of critical reflection this study of mathematics classroom practice exposes the conflicts faced when beliefs and attitudes of both students and teacher are sometimes inconsistent with those inherent in the curriculum guidelines. It also documents some of the difficulties in sustaining teacher research while coping with daily teacher class loads.

ACKNOWLEDGEMENTS

The completion of this thesis is attributable to the assistance of various groups of people. Their contribution is gratefully acknowledged.

Firstly, gratitude is extended to the class of 3B at the participating High School, who willingly learned their mathematics with me in 1997. These students participated in this study enthusiastically and positively, and have since generously loaned me their books from that time. I also thank my colleagues, many of whom have encouraged me in this study with their insights, humour and concern. Thank you for your ongoing interest.

Secondly, I am deeply indebted to my M. Ed. Studs. supervisor, Dr Glenda Anthony, who has dragged me through this thesis. She has been generous with her time and energy; giving constant feedback on chapter drafts, always including valuable suggestions; without her support I am sure this thesis would not have been completed. She has challenged and spurred me on, always showing interest in my work. My many meetings with her were always inspiring.

Thirdly, my sincere thanks to my family for their continual encouragement throughout these years of study. They have supported me in my drive to do this work, and when I looked like faltering, they were ever ready to keep me on track.

I hope this work is confirmation of everyone's belief in me and gives credit to their support and contribution.

TABLE OF CONTENTS

Abstract	i
Acknowledgements	ii
Table of Contents	iii
List of Tables	v

CHAPTER ONE - Introduction

1.1	Background	1
1.2	Changes in Teaching and Learning	2
1.3	Research Objective	3
1.4	Overview	4

CHAPTER TWO - Literature Review

2.0	Introduction	5
2.1	Constructivism in the Classroom	5
2.2	Active Learning	8
2.3	Learning Strategies	10
2.4	Metacognition	11
2.5	Reflective Teacher	14
2.6	Teacher as Researcher	16
2.7	Classroom Studies Relevant to this Study	18
2.8	Summary	24

CHAPTER THREE - Research Process

3.0	Introduction	25
3.1	The Teacher Researcher	26
3.2	Subjects and Setting	28
3.3	Ethical Considerations	29
3.4	Research Schedule	30
3.5	Data Collection	32
3.6	Issues in Teacher Research	33
3.7	Summary	35

CHAPTER FOUR - Results

4.0	Introduction	36
4.1	Questionnaires	36
4.2	Students' Attitudes and Beliefs	39
4.3	Students' Metacognitive Behaviours	50
4.4	Students' Awareness in Mathematics	60
4.5	Teacher's Awareness of Metacognitive Skills	64

CHAPTER FIVE - Discussion and Conclusion

5.0	Introduction	67
5.1	Student Responses	67
5.2	Specific Interventions	69
5.3	Metacognitive Behaviours in the Classroom	71
5.4	Teacher Development	73
5.5	Implications	76

BIBLIOGRAPHY 77

APPENDICES 85 - 92

Appendix A	Information sheet for parents and students	85
Appendix B	Questionnaire on attitudes to mathematics	86
Appendix C	Questionnaire on perceptions of mathematics	87
Appendix D	Questionnaire on ways of working in maths	88
Appendix E	Application to Human Ethics Committee	89

LIST OF TABLES

Table 2.1	Areas concentrated on in PEEL and ESRC projects	20
Table 2.2	Summary of shifts in teacher beliefs	23
Table 4.1	How I feel about mathematics	37
Table 4.2	Learning maths is like ...	38
Table 4.3	Ways of working in mathematics	39
Table 4.4	Different ways of phrasing review questions	47
Table 4.5	Students' mean evaluations of purposes of activity 1	61
Table 4.6	Students' mean evaluations of purposes of activity 2	61
Table 4.7	Students' mean evaluations of purposes of activity 3	62
Table 4.8	Students' mean evaluations of purposes of activity 4	63
Table 4.9	Students' mean evaluations of purposes of activity 5	63
Table 4.10	Overall summary of students' mean evaluations	64