

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.

School Culture and Attitudes to Science

A thesis presented in partial fulfilment
of the requirements for the degree of
Masterate in Education
at Massey University

Anne Megan Bowmar

1997

Abstract

This study investigated possible relationships between school culture and attitudes to science held by teachers and students.

It was a single site case study situated in an Intermediate school, in a middle class suburb of Auckland's North Shore.

It describes how the school has chosen to solve its science delivery problems by setting up a system of prepared science lessons in addition to participating in a science fair and science badge scheme. The values underpinning the school science culture were seen to be: a predominately traditional approach to science, strong leadership, an emphasis on outside schemes and competition.

Teachers had a generally positive attitude to science teaching but expressed both positive and negative sentiments regarding science support in the school. They felt they would have more confidence if their knowledge of science content increased.

Students also had a generally positive attitude to science. Boys, Asian students and form one students scored more highly on curiosity towards and positive image of science than girls, European students and form two students respectively. Students indicated they enjoyed challenging, hands-on science, where they were active both mentally and physically.

The study concludes by proposing two models which draw links between the culture of science in the school and attitudes to science.

Acknowledgements

I would like to express a huge amount of gratitude to my supervisor Dr Janet Burns for her thoughtful and thorough assistance during the inception, progress and finishing of this thesis. Through her facilitation, this has been a thought-provoking, challenging and fulfilling experience.

I would also like to thank Mr Ted Drawnek from the Computer Services department at Massey University for his assistance both on campus and at a distance with SPSXX. The extramural librarians have also been very helpful.

This thesis has also been produced with financial assistance from the Massey University Research Fund for which I am grateful.

Thank you also to Lorraine Bowman for assistance in the formatting of this thesis into a tidy and readable form.

I have also appreciated my family, work colleagues and friends who have shown an interest in this work.

Table of Contents

	page
Title Page	(i)
Abstract	(ii)
Acknowledgements	(iii)
Table of Contents	(iv)
List of Tables	(v)
List of Figures	(vii)
Chapter One: Introduction	1
Chapter Two: Literature Review	4
Chapter Three: Methodology	28
Chapter Four: Science Curriculum in the Study School	46
Chapter Five: Teachers' Perspectives on Science Teaching	78
Chapter Six: Student Perspectives	111
Chapter Seven: The Culture of Science and the Relationship with Students' and Teachers' Attitudes to Science	148
Chapter Eight: Discussion	155
Chapter Nine: Summary of Research Findings	171
References	175
Appendices	186

List of Tables

		page
Table 2.1	Percentage of sixth form students taking biology, chemistry or physics by gender	6
Table 2.2	Percentage of seventh form students taking biology, chemistry or physics by gender	7
Table 4.1	Science topic overview	59
Table 4.2	1995 Bayside school science fair exhibits	71
Table 4.3	The sixteen top projects - 1995 Bayside school science fair	72
Table 4.4	Bayside science fair projects at the regional science fair	74
Table 5.1	Staff composition at Bayside School	78
Table 5.2	Years of teaching experience	79
Table 5.3	Length of time teaching at Bayside School	80
Table 5.4	Highest level of science studied at school	80
Table 5.5	Science experienced by teachers at teachers' college	82
Table 5.6	Science courses completed since leaving teachers' college	83
Table 5.7	Self-reported attitudes to teaching science	84
Table 5.8	Self-reflections on planning and assessment in science teaching	106
Table 5.9	Self-reflections on student-teacher interactions in science	107
Table 5.10	Self reflection on the provision of opportunities to investigate and develop skills	108
Table 6.1	Student characteristics by gender and form level	111
Table 6.2	Student characteristics by ethnicity	112
Table 6.3	Science Curiosity Inventory: Mean scores by form level	114
Table 6.4	Science Curiosity Inventory: Mean scores by gender and ethnicity	116

List of Tables (continued)

		page
Table 6.5	Science Curiosity Inventory: Overall level of interest	117
Table 6.6	Science Curiosity Inventory: Factor scores by form level	118
Table 6.7	Science Curiosity Inventory: Factor scores by gender and ethnicity	119
Table 6.8	Comparison of Smail and Kelly's (1984) factor means with form one Bayside factor means by gender	120
Table 6.9	Science Curiosity Inventory: Comparison of Smail and Kelly's (1984) and Bayside's form one data by gender	120
Table 6.10	Image of Science Inventory: Mean scores by form level	123
Table 6.11	Image of Science Inventory: Mean scores by ethnicity and gender	126
Table 6.12	Image of Science Inventory: Factor means by form level	129
Table 6.13	Image of Science Inventory: Factor means by gender and ethnicity	129
Table 6.14	Image of Science Inventory: Comparison of Smail and Kelly's (1984) factor means and means from Bayside form one students	130
Table 6.15	Image of Science Inventory: Comparison of Smail and Kelly's (1984) and Bayside's form one gender difference data	131
Table 6.16	Open response section - general comments	132
Table 6.17	Open response section - comments pertaining to the teaching of science	135
Table 6.18	Open response section - like/dislike specific parts of science	137
Table 7.1	Triangulation of value: Bayside's predominately traditional view of science	149
Table 7.2	Triangulation of value: Strong leadership	150
Table 7.3	Triangulation of value: Emphasis on outside schemes	150
Table 7.4	Triangulation of value: Competition	151

List of Figures

		page
Figure 1.1	Intended, implemented and attained curriculum	3
Figure 2.1	Rosenberg and Hovland's model of attitude	8
Figure 2.2	Causal model for between school analyses, Keeves (1992)	22
Figure 2.3	Model of culture - Beare and Millikan (1989)	24
Figure 8.1	The relationship between school science culture and attitudes to science	169
Figure 8.2	The relationship between school science culture and attitude to science - a nested system	170