

Peter Grootenboer · Margaret Marshman

Mathematics, Affect and Learning

Middle School Students' Beliefs and
Attitudes About Mathematics Education

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*Peter would like to dedicate this book to Jake,
Danneke, and Talitha.*

*Margaret would like to dedicate this book to
Chaedyn and Cahlia—future middle years
mathematics students.*

Preface

For many years mathematics has been seen as a dull and boring subject that has little relevance to *real life*, and seemingly these views develop at school. This book focuses on the beliefs, attitudes, values and emotions of students in Years 5–8 (aged 10–14 years) about mathematics and mathematics education. There has been considerable interest in the affective domain in mathematics education over the past two decades and many of the studies that have been with adult participants (often preservice primary teachers). While these studies have been useful in describing the beliefs, attitudes and feelings of people about mathematics, and highlighting the poor image of the subject amongst much of the population, there appears to be a shortage of research actually undertaken with children. If indeed people are developing many of their resistant views about mathematics during their schooling, then it is important to actually investigate students' affective views of mathematics while they are at school. Clearly, negative views of mathematics can detrimentally impact student's capacity to learn mathematics well at school and to use it effectively throughout their life. Conversely, students who are positively disposed towards mathematics are more likely to engage in mathematical activities and participate in opportunities that have a mathematical dimension.

Fundamentally, this book focuses on this topic—the development of affective views and responses towards mathematics and mathematics learning. Furthermore, it seems that students develop their more negative views of mathematics during the middle school years (Years 5–8), and so here we concentrate on students in these critical Years. This book is built on some empirical studies including qualitative enquiries with children in Years 5 and 8, and a large scale ($n = 1784$) quantitative study with students from a range of schools across diverse communities in New Zealand. While these studies were undertaken in a particular part of the world, the issues are common and have been reported across Australasia, Europe and the Americas, and so the findings have broad relevance and application. The studies revealed a number of key findings including:

- a view that mathematics is about numbers;
- the most important aspect of mathematics is learning your times-tables;

- students' emotional responses to mathematics and learning mathematics were related to their achievement and confidence;
- in general, the affective responses of students diminished as they moved up through the Years;
- there is a relationship between mathematical performance and attitudes to mathematics and beliefs about mathematics; and,
- despite the widespread high achievement of girls in mathematics, various groups of students expressed a view that “boys were better than girls” in mathematics.

The students' affective responses to mathematics—their beliefs, attitudes and feelings, were grounded in their experiences, and these experiences were confined primarily to the classroom. Given that students are learning their affective responses to mathematics in school mathematics lessons, and their views seem to be diminishing as they progress through their schooling, there is a need for a more holistic view of mathematics education in research, theory and practice—to consider the development of mathematical identities. This perspective promotes the simultaneous consideration of the mathematical development in knowledge, skills, beliefs and attitudes. Students with healthy mathematical identities usually achieve better results in mathematics courses, will engage more wholeheartedly in their mathematical learning, are more likely to continue with their studies in mathematics, and will more readily participate in mathematical experiences.

A feature of this book is that it brings some substantial empirically-based understandings to the widely held perception that many students have negative views of mathematics, and these affective responses develop during the middle years of school. Specifically, the data for this book were collected with school students, and students who were actually engaged in learning mathematics in their crucial middle school years. Therefore, the findings reported and discussed here are relevant for researchers and mathematics educators, policy makers and curriculum developers, and teachers and school leaders engaged in the teaching of mathematics.

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Second, we want to express our thanks to our colleagues who read draft versions of this book and provided thoughtful feedback and questions. This included Dr. Kevin Larkin and Dr. Harry Kanansa at Griffith University, Dr. Shaileigh Page, and Associate Professor Peter Dunn and Dr. Rob McDougall at University of the Sunshine Coast. Dr. Aaron Wiegand produced some of the graphs. We also wish to acknowledge the support of our professional community—MERGA, and our colleagues who have helped us develop and refine our ideas and thoughts.

Peter would specifically like to thank his colleagues in the *Pedagogy, Education and Praxis* research collaboration group. Although these colleagues aren't specifically interested in mathematics education, they so provide a thoughtful academic community that stimulates theoretical and practical educational consideration. He also wishes to thank his colleagues in the *Griffith Institute for Educational Research* for practical and intellectual support over many years. Finally, Peter wants to thank his family and friends for their generosity, love and support over the time of this research and writing. Specifically, Ange, Jake, Danneke and Tilly at home; Willem, Beverley, Janine, Matt and Michelle as we grew up; and, Murray, Peter and Nick on the golf course.

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Contents

1 Introduction	1
The Importance of Mathematics	2
Researching and Understanding Affect in Mathematics Education	3
Learning in the Middle Years	5
The Significance of the Teacher	6
Outline of the Book	8
References	10
2 The Affective Domain, Mathematics, and Mathematics Education	13
The Affective Domain	14
Beliefs	15
Changing Beliefs	16
Beliefs About Mathematics and Mathematics Education	17
Values	18
Attitudes	19
Attitudes to Mathematics	19
Emotions	20
The Affective Domain	22
Affect and Mathematics Education	22
Mathematical Affect and Learning Mathematics	23
Mathematical Affect and Mathematical Achievement	25
Mathematical Affect and Future Mathematical Engagement	26
Mathematics Education as Developing Mathematical Identities	27
Overview and Summary	29
References	30
3 Investigating Students' Ideas About Mathematics and Mathematics Education	35
Researching the Affective Domain in Mathematics	36

- Kids Talk About Maths Study 36
 - Data Collection 37
 - Data Analysis 39
 - Key Themes 39
- Kids Ideas About Maths Study 41
 - The Instrument 42
 - The Participants. 42
 - Data Analysis 43
 - The Affective Subscales 43
- Secondary Studies 46
- Key Findings and Themes from Across the Studies 47
 - Mathematics Is About Numbers. 48
 - Times-Tables 49
 - Other General Findings 50
- Summary 50
- References 51

- 4 Students’ Beliefs and Attitudes About Mathematics and Learning Mathematics 55**
 - The Importance of Mathematics. 56
 - Beliefs About the Nature of Mathematics 58
 - Utilitarian Beliefs 59
 - Traditional Beliefs 62
 - Beliefs About Learning Mathematics 64
 - Attitudes Toward Mathematics and Learning Mathematics 67
 - Mathematics Anxiety 71
 - Summary 72
 - References 73

- 5 Differences in the Affective Responses of Various Groups 75**
 - Gender 76
 - Cultural Identity. 78
 - Mathematical Performance 81
 - Socio-Economic Status (SES) 84
 - Type of School 86
 - Conclusion 87
 - References 88

- 6 Changes in Affective Responses to Mathematics Through the Middle School Years. 91**
 - Sliding Affective Responses to Mathematics 92
 - Positive Attitude 95
 - Utilitarian Beliefs 97
 - Traditional Beliefs 98

Maths Anxiety	100
Liking School and Liking Mathematics	101
So What Do Students Say About Mathematics at These Times?	102
The Mathematics Curriculum Through the Middle School Years	104
Implications for Mathematical Pedagogical Practice	105
Summary	108
References	109
7 Building Positive Affect in Mathematics.	111
Summary and Review of the Key Findings	112
Mathematics Is Mainly About Numbers	112
Mathematics Is Important	113
Traditional Beliefs About Mathematics	113
Positive Attitude to Mathematics	114
Gender Issues	114
Socio-Economic Status	115
Affective Responses Across the Primary-Secondary Transition	115
Developing Mathematical Identities	116
Foregrounding Identity	116
Mathematical Identities and Developing a Sense of Belonging.	118
Implications for Practice	119
Critical Perspectives on Mathematics Education.	119
The Site-Based Nature of Mathematics Education	121
Practice Architectures	121
Developing Mathematical Identities	123
Concluding Comments	127
References	128
Appendix A: Kids’ Ideas About Maths Survey	131
Appendix B: Engaging the Middle Years Students in Mathematics.	
Student Perception Survey	133

List of Figures

Fig. 1.1	One participant’s drawing of her mathematics teacher	7
Fig. 2.1	A model of conceptions of the affective domain (Grootenboer 2003; Leder and Grootenboer 2005).	14
Fig. 2.2	The relationship between factors that affect students’ attitude toward mathematics (Goodykoontz 2008)	20
Fig. 3.1	The student response sheet questions and prompts.	38
Fig. 6.1	Observed levels of the use of productive pedagogies in classrooms in the Queensland school reform longitudinal study (Pendergast 2010).	92
Fig. 6.2	Mean responses to the item ‘I am good at maths’	94
Fig. 6.3	Students’ responses to the individual positive attitude statements	96
Fig. 6.4	Students’ responses to the individual utilitarian beliefs statements	98
Fig. 6.5	Students’ responses to the individual traditional belief statements	99
Fig. 6.6	Student responses to the maths anxiety statements.	100
Fig. 6.7	Comparison of how students like maths and like school.	102
Fig. 6.8	Organisation of the New Zealand curriculum (Ministry of Education 2007b)	104
Fig. 6.9	Year level variation in the productive pedagogies domain scores across the middle years (Luke et al. 2003, p. 92)	105
Fig. 6.10	A group of middle years teachers Y chart about what they thought an engaged and learning middle years classroom would look like, sound like and feel like	108
Fig. 7.1	The theory of practice architectures (Kemmis et al. 2014)	123

List of Tables

Table 2.1	Identity discourses across three theoretical perspectives (Grootenboer et al. 2006, p. 613)	28
Table 3.1	Rotated matrix and factor names	44
Table 3.2	Means, standard error of means, medians standard deviations, skewness and kurtosis values, and cronbach’s alpha coefficients of the subscales	45
Table 3.3	Means, standard error in the means and standard deviation for girls and boys responses to “boys are better at maths than girls”.	50
Table 4.1	Utilitarian beliefs about mathematics.	60
Table 4.2	Traditional beliefs about mathematics	63
Table 4.3	Beliefs about learning mathematics	65
Table 4.4	Positive attitudes to mathematics	69
Table 4.5	Mathematics Anxiety	71
Table 5.1	Students liking of mathematics and liking of school	77
Table 5.2	The mean and standard error for students’ affective responses to mathematics.	77
Table 5.3	The mean and standard error for the positive attitude, traditional belief and maths anxiety for students of different cultural identity	80
Table 5.4	The mean and standard error for the positive attitude, traditional belief and maths anxiety of students of Pakeha, Maori and Pasifika cultural identity.	81
Table 5.5	The mean and standard error for the affective subscales vis-à-vis students’ mathematical ability	83
Table 5.6	The means and standard errors for the affective subscales vis-à-vis socio-economic status.	85
Table 5.7	The means and standard errors for the affective subscales vis-a-vis school type	86

Table 6.1	The mean and standard error for “I am good at maths” across primary and secondary students	93
Table 6.2	The mean and standard error for positive attitude across primary and secondary students ($t = -8.791$, $p = 0.000$)	95
Table 6.3	The mean and standard error for utilitarian beliefs across the primary/secondary year levels ($t = 0.053$, $p = 0.596$)	97
Table 6.4	The mean and standard error for utilitarian beliefs across the year levels ($t = -4.261$, $p = 0.000$)	97
Table 6.5	The mean and standard error for traditional beliefs across the year levels ($t = -3.810$, $p = 0.000$)	99
Table 6.6	The mean and standard error for maths anxiety across the year levels ($t = 5.806$, $p = 0.000$)	100
Table 6.7	Primary and secondary mean responses to ‘I like maths’ and ‘I like school’	101