

**SUSTAINING THE PROFESSIONAL IDENTITY OF
BEGINNING TEACHERS IN EARLY MATHEMATICS,
SCIENCE AND TECHNOLOGY TEACHING**

Marié Botha

2012



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

**SUSTAINING THE PROFESSIONAL IDENTITY OF
BEGINNING TEACHERS IN EARLY MATHEMATICS,
SCIENCE AND TECHNOLOGY TEACHING**

by

Marié Botha

Submitted in partial fulfilment of the requirements for the degree

PHILOSOPHIAE DOCTOR
Curriculum Instruction

Department of Science, Mathematics and Technology

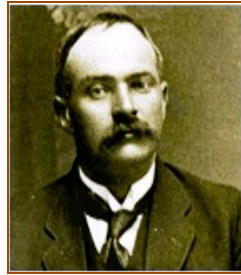
SUPERVISOR
Prof G.O.M. Onwu

2012



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

I dedicate this study to



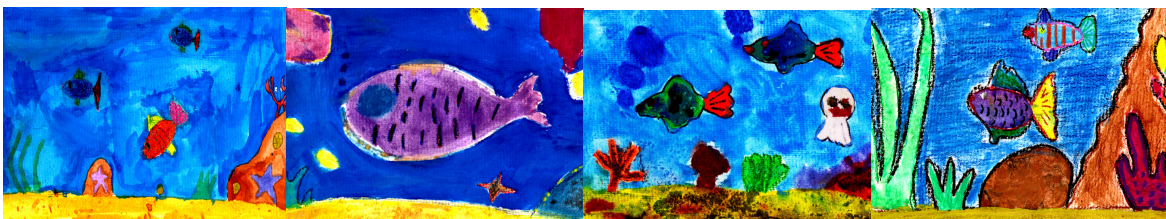
My grandfather, Juriaan van Twisk. You came from Amsterdam in the beginning of the twentieth century as a young science teacher to teach the children of South Africa. You were recruited at a time when there was a shortage of science teachers. You inspired your children, grandchildren and other people's children with stories and real life experiences in language, mathematics, science, music and art.

My husband Simon. You gave your time, you listened to me, you provided me with insightful remarks, ideas and you supported me during this long journey.

My daughter Sulette, a committed teacher of young children. During your first year of teaching in 2006 you made me aware of the experiences through which you had to live. Through your stories you made me wonder about the working lives of beginning teachers.

My grandson Jason Philip Smit. Through your eyes I see the future.

Above all else, I dedicate this study to all the teachers who passionately devote their lives to the teaching of young children.



'If a child is to keep alive his inborn sense of wonder, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and the mystery of the world we live in.' Rachel Carson (1907-1994)

ACKNOWLEDGMENTS

This study contributed to my own identity formation as a teacher educator, a researcher, and writer. The research was a long, challenging and multifaceted journey. I could not have sustained and finished this study without a group of people who supported, motivated and guided me.

I wish to express my sincere appreciation to my supervisor and mentor, Prof Gilbert Onwu, for his invaluable academic advice, insights and guidance. It was your continued support through the process and your excitement about the study that encouraged me in many ways. Thank you for your time, your patience, support and humour.

I would also like to thank my participants: the real teachers behind the characters of Bea, Riana, Lea, Gina, Jenna and Anne-Marie. This group of beginning teachers gave their time, they trusted me and they inspired me; they shared their experiences with me as they allowed me to listen to their voices and observe their practices. It was through their words and practices that I was able to make sense of and write their professional teacher identity portraits.

I would particularly like to thank Professor Max Bergman from the University of Basel for his inspirational advice, in the beginning of this study. You helped me narrow down my thoughts and focus.

And a special thanks to the Project SUSTAIN. I was fortunate to have on-going academic and funding support from the project. I would like to thank the Project SUSTAIN academic team from the different universities (South Africa, Malawi, Zambia and Norway). Heartfelt thanks to all my Project SUSTAIN friends and fellow students for their camaraderie, specially, Monde and Franci, who listened to me and encouraged me during the ups and downs of this journey.

In edition I am grateful for the financial support through the Foundation Phase EU Project and the University of Pretoria in the form of a bursary. Recognition is also due to Prof Cyclic Hartell. You supported and encouraged me in many ways and so did my colleagues in the Department of Early Childhood Education.

My sincere gratitude goes to Hester van der Walt for her meticulous editing and practical advice. I express a genuine appreciation to Adrie van Dyk for the technical editing.

I would also like to thank Hilde van Lysebettens from Artevelde Hogeschool and Michel Vandebroek from Ghent University who introduced me to the concept of identity formation through conversations and the stories in Michel's book.



De blik van de Yeti

*Teke proeten
van Hilde*

oktober 2005

*Voor mij was dit boek een reis
ik loop, ook voor jou*

Michel

‘Wat begin als een zoektocht naar het bekende, eindig in een ontmoeting met het vreemde en de ontdekking van de kostbaarste zeldzaamheid’ – Michel Vandebroek

DECLARATION OF AUTHORSHIP AND COPYRIGHT

I declare that this work titled:

SUSTAINING THE PROFESSIONAL IDENTITY OF BEGINNING TEACHERS IN
EARLY MATHEMATICS, SCIENCE AND TECHNOLOGY TEACHING

is my own and that it has been written in my own words. All citations from literature
have been acknowledged in-text and referenced in full.

I understand that all rights with regard to intellectual property in the work vest in the
University of Pretoria who has the right to produce, distribute and/or publish the work
in any manner considered fit.

My supervisor and I agree that subject to the University as owner of all intellectual
property rights in this work, the approved version may be placed in the UpeTD
archive with the following status:

Release the entire work immediately for worldwide access.

Signature.....

MARIÉ BOTHA

Date.....

Signature.....

GILBERT O.M. ONWU

Date.....

ABSTRACT

The focus of this study is on foundation phase and early childhood teachers' professional identity formation. This study is about six beginning teachers in their first year of teaching early mathematics, science and technology (MST) in different schools and grade levels.

Early childhood settings and primary schools in South Africa have a diverse learner body that increasingly demands of beginning early childhood and foundation phase teachers to continually strive to adapt their teaching and young children's learning to the different learning environments for effective implementation of the curriculum.

A learning identity framework was used to generate and analyse data. The learning identity framework is premised on the assumption that identity and learning are closely linked and that both are influenced by factors internal and external to the individual.

Specifically, the study sought to answer the research question of how beginning first-year early childhood and foundation phase teachers form, sustain or change their professional teacher identity in the teaching of mathematics, science and technology (MST) in the early years and in different school settings.

The study used a phenomenological approach and case study method to explain the professional teacher identity formation process and to illuminate what factors influence this process. The study researched how teacher identities can be narratively constructed on the basis of the lived experiences of the six teachers in different school contexts. Data was generated from different sources for the purpose of triangulation which included visual and written narratives, observations and interviews (open and semi-structured). The analysis and results were based on categories of descriptions of themes. The findings indicate that identity formation is an ongoing process of integration of teachers' personal and professional histories and initial teacher education and training, alongside issues of school culture and

institutional (in-school) support. Those key factors emerge as strong determinants of the kinds and the relative stability or otherwise of professional identities which the six teachers develop in the first year of MST teaching, and thus the kind of reform-minded teachers they become.

---oOo---

KEYWORDS

Beginning teachers
Professional teacher identity
Early mathematics science and technology teaching
Teacher education programme
School contexts, foundation phase
Early childhood education
Inquiry-based approach
Identity formation

---oOo---



ACRONYMS

DoE	Department of Education
ECP	Early Childhood Phase
FP	Foundation Phase
GET	General Education and Training in Interview
LPTI	Learnt professional teacher identity
MST	Mathematics, Science and Technology
NR	Narrative Reflection
O	Observation
OR	Observational Reflection
OBE	Outcome-Based Education
OECD	Organisation for Economic Co-operation and Development
(R)NCS	Revised National Curriculum Statement



TABLE OF CONTENT

	Page
CHAPTER ONE	
INTRODUCTION AND BACKGROUND TO THE STUDY	
1.1 INTRODUCTION	1
1.2 BACKGROUND TO THE STUDY	4
1.2.1 EARLY MATHEMATICS SCIENCE AND TECHNOLOGY CURRICULUM	5
1.2.1.1 Early childhood phase	5
1.2.1.2 Foundation phase	6
1.2.2 TEACHER EDUCATION PROGRAMMES	8
1.2.3 THE BEGINNING TEACHER AND PROFESSIONAL IDENTITY FORMATION	11
1.3 THE PROBLEM OF THIS STUDY	13
1.3.1 RESEARCH QUESTIONS	16
1.4 SIGNIFICANCE OF THE STUDY	17
1.5 PURPOSE OF THE STUDY	19
1.6 CLARIFICATION OF CORE CONCEPTS AND TERMINOLOGIES	19
1.6.1 PROFESSIONAL TEACHER IDENTITY	19
1.6.2 PROFESSIONAL TEACHER IDENTITY FORMATION	20
1.6.3 REFORM-MINDED TEACHER	20
1.6.4 EARLY CHILDHOOD PHASE	20
1.6.5 FOUNDATION PHASE	20
1.6.6 INQUIRY-BASED APPROACH	21
1.6.7 BELIEFS	21
1.6.8 CRITICAL REFLECTION	22
1.7 CHAPTER OUTLINE	22

CHAPTER TWO LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1	INTRODUCTION	24
2.2	PROFESSIONAL TEACHER IDENTITY FORMATION	24
2.3	TEACHER EDUCATION PROGRAMMES	26
2.4	THE BEGINNING TEACHER	31
2.5	MATHEMATICS, SCIENCE AND TECHNOLOGY TEACHING AT EARLY CHILDHOOD AND FOUNDATION PHASE LEVEL	37
2.5.1	EARLY MATHEMATICS.....	41
2.5.2	EARLY SCIENCE.....	42
2.5.3	EARLY TECHNOLOGY.....	43
2.6	CONCEPTUAL FRAMEWORK	45
2.6.1	EXTERNAL FACTORS.....	47
2.6.2	INTERNAL FACTORS.....	48
2.7	CONCLUSION	49

CHAPTER THREE RESEARCH METHODOLOGY

3.1	INTRODUCTION	50
3.2	RESEARCH METHODOLOGY	50
3.3	CASE STUDY METHOD	51
3.4	SAMPLING PROCEDURE	52
3.5	ASSUMPTIONS OF THE STUDY	53
3.6	THE RESEARCH PROCESS	54
3.6.1	DATA COLLECTION INSTRUMENTS	54
3.6.1.1	Photo collages	55
3.6.1.2	Narrative reflection	56
3.6.1.3	Semi-structured individual interviews	57
3.6.1.4	Informal observation, field notes and beginning teachers' reflections	58
3.6.2	DATA COLLECTION STAGES AND DATA ANALYSIS PROCESSES: AN INTERACTIVE PROCESS	61
3.6.2.1	Photo collages	64
3.6.2.2	Narrative reflection	64
3.6.2.3	Semi-structured interview	65
3.6.2.4	Observation	66
3.6.2.5	Observation reflection	67
3.6.3	DATA ANALYSIS STRATEGIES	68
3.6.3.1	Theme construction	70

	Page
3.7 ETHICAL CONSIDERATIONS	73
3.7.1 INFORMED CONSENT.....	73
3.7.2 VOLUNTARY PARTICIPATION (CONFIDENTIALITY, ANONYMITY AND SAFETY IN PARTICIPATION).....	74
3.7.3 TRUST.....	74
3.7.4 RISKS AND BENEFITS.....	75
3.8 VALIDATION OF THIS STUDY	75
3.9 CHALLENGES AND STRENGTH OF THE STUDY	76
3.10 CONCLUSION	78

CHAPTER FOUR
REPORTING THE RESULTS OF SIX CASES:
THE NARRATIVE PORTRAITS OF BEGINNING TEACHERS’
PROFESSIONALTEACHER IDENTITY FORMATION IN EARLY
MATHEMATICS, SCIENCE AND TECHNOLOGY

4.1	INTRODUCTION	79
4.2	NARRATIVE DESCRIPTIONS: SIX BEGINNING TEACHERS’ PROFESSIONAL IDENTITY PORTRAITS	79
4.2.1	THE CASE OF BEA	80
4.2.2.	THE CASE OF RIANA	86
4.2.3	THE CASE OF LEA	94
4.2.4	THE CASE OF GINA	103
4.2.5	THE CASE OF JENNA	110
4.2.6	THE CASE OF ANNE-MARIE	117
4.3	SUMMARY OF IDENTITY PORTRAITS OF BEGINNING TEACHERS IN EARLY MST TEACHING AND LEARNING	122
4.4	CONCLUDING REMARKS	126

CHAPTER FIVE
DISCUSSION OF RESULTS OF SIX BEGINNING TEACHERS’
PROFESSIONAL TEACHER IDENTITY FORMATION IN EARLY
MST TO EXISTING LITERATURE

5.1	INTRODUCTION	127
5.2	FINDINGS OF THE STUDY	127
5.2.1	PROFESSIONAL TEACHER IDENTITY FORMATION OF BEGINNING TEACHERS IN MST.....	128
5.2.1.1	Initial teacher education programme.....	129
5.2.1.2	School context.....	133
5.2.1.3	Institutional support.....	138
5.2.1.4	MST Curriculum interpretation and implementation.....	139
5.2.1.5	Professional teacher identity.....	152
5.2.1.6	To summarise.....	153
5.2.2	FACTORS AFFECTING BEGINNING TEACHERS’ PROFESSIONAL TEACHER IDENTITY FORMATION IN EARLY MST.....	154
5.2.2.1	Internal factors that influenced beginning teachers’ professional teacher identity in early MST.....	154
5.2.2.2	External factors that influence beginning teachers’ professional teacher identity in early MST.....	157
5.3	CONCLUSION	164

CHAPTER SIX CONCLUSIONS AND RECOMMENDATIONS

6.1	INTRODUCTION	165
6.2	A SYNOPTIC OVERVIEW OF THE STUDY	165
6.3	MAIN RESEARCH QUESTION AND SUB-QUESTIONS	166
6.3.1	MAIN RESEARCH QUESTION	166
6.3.2	SUB-QUESTION ONE	169
6.3.3	SUB-QUESTION TWO	170
6.3.3.1	External factors	170
6.3.3.2	MST curriculum interpretation and implementation	171
6.3.3.3	Internal factors	172
6.3.4	SUB-QUESTION THREE	173
6.4	CONCLUSIONS OF THE STUDY	174
6.4.1	CONCLUSION ONE: PROFESSIONAL TEACHER IDENTITY	174
6.4.2	CONCLUSION TWO: TEACHER EDUCATION PROGRAMME	175
6.4.3	CONCLUSION THREE: MST TEACHING AND LEARNING	175
6.4.4	CONCLUSION FOUR: MST CURRICULUM	176
6.4.5	CONCLUSION FIVE: SCHOOL CONTEXT	177
6.5	RECOMMENDATIONS AND FUTURE DIRECTIONS FOR RESEARCH	177
6.5.1	RECOMMENDATION ONE: PROFESSIONAL TEACHER IDENTITY FORMATION	177
6.5.2	RECOMMENDATION TWO: TEACHER EDUCATION PROGRAMMES	178
6.5.3	RECOMMENDATION THREE: MST TEACHING AND LEARNING	178
6.5.4	RECOMMENDATION FOUR: MST CURRICULUM (POLICY)	178
6.5.5	RECOMMENDATION FIVE: SCHOOL CONTEXT	179
6.5.6	RECOMMENDATIONS FOR FURTHER RESEARCH	180
6.6	FINAL THOUGHTS	180

	Page
REFERENCES	182
APPENDICES	201
Appendix A Participants letter of consent	
Appendix B Photo collage and written narrative reflection	
Appendix C Individual semi-structured interview schedule	
Appendix D Gauteng Department of Education letter of consent	
Appendix E Appendix E: Schools letter of consent	
Appendix F Parents letter of consent	
Appendix G Open observation schedule	

---oOo---

LIST OF FIGURES

	Page
Figure 2.1 Conceptual framework (learning identity framework)	47
Figure 3.1 Examples of Bea's photo collages in mathematics collected during stage one	64
Figure 3.2 The integrated process of data collection and data analysis	70
Figure 4.1 Bea's classroom practice (observation and photo collages)	85
Figure 4.2 Riana's classroom practice (observation and photo collages)	94
Figure 4.3 Lea's classroom practice (observation and photo collages)	102
Figure 4.4 Gina's classroom practice (observation and photo collages)	110
Figure 4.5 Jenna's classroom practice (observation and photo collages)	117
Figure 4.6 Anne-marie's classroom practice (observation and photo collages)	121
Figure 6.1 Operational learnt professional teacher identity (LPTI)	180

---oOo---



LIST OF TABLES

	Page
Table 3.1	Profile of participants 53
Table 3.2	Open observation schedule 60
Table 3.3	Research sequence for data collection 60
Table 3.4	The data collection stages and data analysis processes 63
Table 3.5	Observation of Bea's lesson 66
Table 3.6	Example of statements and quotes from Bea's case 71
Table 3.7	Data collection methods, limitations and enrichment of validation 77
Table 4.1	Summary of identity portraits of beginning teachers in Early MST teaching and learning 123
Table 6.1	External and internal factors that affected beginning teachers' professional teacher identity 170

---ooOoo---