

New Teacher Identity and Regulative Government

The Discursive Formation of
Primary Mathematics Teacher Education

MATHEMATICS TEACHER EDUCATION

VOLUME 2

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New Teacher Identity and Regulative Government

The Discursive Formation of
Primary Mathematics Teacher Education

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ABOUT THE AUTHORS

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Originally from London, Tony Brown trained in Canterbury and Exeter, before returning to London where he taught mathematics for three years at Holland Park School. This was followed by three years as a mathematics teacher educator for Volunteer Services Overseas in Dominica in the Caribbean. In 1987 he completed his PhD at Southampton University. His doctoral research focused on language usage in mathematics classrooms, especially where the fluent use of English could not be assumed. After a spell as a mathematics coordinator in a middle school in the Isle of Wight Tony moved to Manchester Metropolitan University. In Manchester, Tony was the leader for doctoral studies in education as well as participating in a range of other courses and became a professor in 2000. More recently he completed a project to pilot a distance-teaching programme enabling British volunteers based in Africa to research their own teaching practice within a programme of professional development.

Tony has published two previous books. *Mathematics Education and Language*, published in Kluwer's Mathematics Education Library series, outlines his interest in mathematics in schools. *Action Research and Postmodernism* (Open University Press, 2001), a book written with Liz Jones, explores how teachers might carry out practitioner research within higher degrees. Tony has also written extensively in journals.

At time of writing Tony is on leave from Manchester for a spell at the University of Waikato where he is the first Professor of Mathematics Education in New Zealand.

Olwen McNamara

Manchester born and bred Olwen has taught mathematics in schools for over 20 years until in 1996, after straddling the divide between school and university whilst completing her PhD, she finally left teaching to work with a collaborative research-based partnership of schools, Local Education Authorities and universities. She subsequently worked at Manchester Metropolitan University as an educational researcher and taught on masters and doctoral programmes in the field of teacher development, before moving to the University of Manchester in 2002 where she is now a Reader and Director of the Primary Initial Teacher Training programme.

Since 1998 her research portfolio has included numerous projects in the areas of initial and continuing development of teachers, with a special interest in mathematics teacher education and professionally focused, practitioner oriented research. She has published widely in international journals in both these areas and has also published two previous books: *Becoming an Evidence-Based Practitioner* (RoutledgeFalmer, 2002) and *Practitioner Research and Professional Development in Education* (with Campbell and Gilroy) (Paul Chapman, 2004).

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CHAPTER ONE

INTRODUCTION

This book seeks to address the question of how the task of teaching mathematics to young children might be better understood. But rather than starting out with a conception of mathematics derived from the many histories mathematics might claim as its own we centre the analysis instead within the social practices that surround the teaching of the subject to children aged four to eleven in English primary schools today. That is, we do not commence with an *a priori* conception of mathematics and see what people are saying about it. Rather, we start from what people are saying and see where this points. We probe how the desires of society have manifested themselves in a societal decision to teach mathematics and how this decision now shapes that which is called “mathematics”. We focus on the operation of the noun “mathematics” and verb “mathematical” and consider how the meanings of these terms derive from the social domain in which they are being used. This extends and develops a conception of how language intervenes in the task of mathematics education presented elsewhere (Brown, 2001). In this present book however, we have a particular focus on trainee and newly qualified teachers, with a view to pinpointing how this conception of mathematics manifests itself in their evolving practices. We question how such teachers with many years of experience as a pupil in school might now re-orient themselves towards the demands of teaching mathematics in schools. We consider how those charged with providing training for such individuals might better understand the process and the impact of this training. The book further questions the way in which the balance might be conceptualised between nurturing teachers to become autonomous professionals responsible for developing and delivering the mathematics curriculum in schools and setting policies that prescribe practices to be followed. But first we shall try and illustrate the task.

There was a programme on English television a few years ago discussing contemporary architecture. It featured a multi-purpose building incorporating apartments, offices and indeed a whole shopping precinct. The building was being offered as an example of “post-modern” architecture. It incorporated many novel design features. A key aspect being discussed was the way in which the building defied so many of the conventions that are ordinarily assumed in building design. It was suggested that for someone visiting the building for the first time the experience could be quite disconcerting. So many of the normal cues one follows in moving around a building generally were absent in this particular building. For someone visiting the shops the sense of space in the precinct was quite alien. To find a particular shop on one occasion seemed to offer no guarantee that it would be easily located on a subsequent visit. Such post-modern design, it was suggested, is often associated with the burgeoning range of choices on offer when it comes to creating such buildings. Complexity generates stylistic opportunity. Any supposed interface between style and function can be disrupted. For the consumer one may think of

diversity and freedom of choice. The programme however was arguing that, for many visitors, rather than enjoying this choice, the building actually triggered a sense of insecurity. The visitor, concerned as they were with finding the pharmacy or whatever, tired of these architectural games and just wanted some clear advice, from anyone. "Just tell me where the pharmacy is please, and how to get there quickly!"

There are clearly alternative approaches to such navigational challenges. The architect may well enjoy observing visitors to his building struggle a little in learning about new ways of understanding a building. She may see herself at the cutting edge of design, challenging conceptions of how buildings might be inhabited and otherwise utilised. Disorientation might be part of the excitement of learning to live new life styles. Such may be the appeal to some customers or residents who appreciate exploring new ways of living near to others. They may enjoy living on the edge, asserting contemporary identity as city dwellers, redefining their sense of space and associations between home, work and leisure. The director may see his company's location in such a building as participation in an image culture and the sense of place that confers in the business world. At a purely functional level the compression of space may have economic virtue, and for the initiated provide easy access to a range of facilities. The pharmacy manager may get a little frustrated, however, if customers were not able to find his store again. Similarly, the civic authority might well assume some responsibility for fire regulations and insist upon labelling exits clearly. Inevitably, decisions relating to how the building is used are a function of design, the potential scope for modification of this design, the people who choose to live in the building, how they choose to live in it, and regulations at local and national level. Each of these factors may vary in importance and over time. Buildings often live through many eras and adapt to new demands through the passage of time. Their design and function relate to societal understandings of how people might live. Their usage is to varying degrees a function of how individuals shape the buildings around their individual and specific needs.

Our task here is to examine definitions of what it is to be a teacher of mathematics in a primary school and how individual teachers seek to reconcile their own personal aspirations with the social environment they encounter. In particular we are concerned with how mathematical understanding is shaped between the individual's grasp of the subject and the institutional definition of it. Nevertheless, the architectural metaphor will assist us in pointing to how we see teachers confronting their own specific professional spaces. The professional landscape we shall suggest guides the teacher's individual practice against a backdrop of diverse and complex social demands. The work of schools is targeted at enabling pupils to participate in a rapidly changing world where consensus on educational objectives seems difficult to achieve. How people live, inevitably, to some extent, is a function of the environment they encounter. And many recent policy shifts relating to teaching mathematics in English schools point to a supposition that adjustment of this environment will influence the activity that is taking place within it. In the perceived complexity there has been a decision to throw out a lifeline to teachers in the form of a highly structured framework against which they can work, which in turn will structure the learning environment encountered by children. Yet surely in

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spite of all this complexity, teachers themselves do have some say, and would want some say, over how they conduct their own lives. They are not infinitely susceptible to social conditions and the guidance of their leaders. Teachers do have a voice of their own through which they express their own aspirations of what it is to be a teacher.

So having offered a metaphor for the professional landscape let us now consider a metaphor for a person working within it and the sort of voice they might have. Karen is a trainee teacher in her final year of training. She is aware of a multitude of demands that she faces. Apart from meeting university requirements she will need to fit in with the expectations of the school where she will be placed in her final year. She may face some additional scrutiny from government inspectors. She may well wish to be popular with children and their parents. She will be teaching up to eleven curriculum subjects including mathematics, our particular concern in this book. She will need to build an enjoyable conception of mathematics, whilst following the mathematics curriculum adequately. She will need to minimise anxieties pupils feel towards the subject and perhaps, as we shall show, attend to some of her own anxieties in this direction. During this year she will face a formal test of her mathematical knowledge. Over and above all of these demands, she may well hold on to some of her own personal aspirations with regard to her chosen profession.

Reflecting on such demands, Karen is aware that in most of her contributions she is an agent acting on behalf of others with specific stakes in the educational process. Her discussions with colleagues, tutors, and children have become a pastiche of things that she feels other people would want her to say. She has become quite alarmed by the absence of her “own voice”. But then again, Karen conjectures, maybe this is now her “own voice”, steeped as she now is in the professional way of talking about the job of being a teacher in an English primary school. Her sense of self in such a professional role is held in by the expectations of others. Her personal aspirations of what it is to be a teacher, have become subsumed or conditioned by the language she feels compelled to speak in order to become accredited and then employed within a school. But then again even if it were possible to find the real Karen, who would this be? The Karen that she thinks she is? The Karen that Karen wants to be? The Karen that she was before her training? The Karen who is seen by others? But which others?

Suppose that we imagine Karen lying back on a psychoanalyst’s couch where she talks of her life, her motivations, fears and aspirations. And in pinpointing these motivations, fears and aspirations, in words spoken to the psychoanalyst, they somehow become more real and tangible for her. As such they emerge as guiding principles for how Karen lives her life thereafter. The words and the way they are put together become part of her. The story that Karen tells of her life shapes her actual experience by providing a framework against which she understands what she is doing. Nevertheless, this reification of lived experience can deceive as well as enlighten. Some versions of self are more comfortable than others, and Karen may choose a version with which she feels she can work. Meanwhile society itself has an image of how it conducts itself and promotes particular understandings of normality, and in particular of how teachers like Karen should behave. Such socially derived understandings provide a backdrop to individuals making sense of their own lives

within this frame. For Karen, the final stage of her training seemed to go hand in hand with being fully integrated into the profession and all of the obligations that entailed. And with that, to paraphrase some post-modernist jargon, she had been *interpellated* by all manner of alternative discourses, using her as some sort of ventriloquist's dummy.

In this book we are pursuing an interest in how understandings of mathematics emerge in the interplay between pupils, teachers and the societal structures they inhabit. On the macro level there is a social environment of infinite complexity where emancipation vies with social control. On the micro level the teacher juggles between deciding for herself and being told what to decide. As a social participant she seeks to share space with others in a way that meets common and alternative needs. Our core theme however relates to trainees learning to teach primary mathematics. We will be tackling the issue of the professional development of teachers, as the teachers themselves understand it. We question how they reconcile personal aspirations of what it is to be a teacher with the external demands that they face. That is, how do they live their life in the world they encounter. We shall address how student teachers evolve into paid classroom practitioners with a particular brief of teaching children in the primary classroom. More specifically, we focus on how such student/novice teachers address the topic of mathematics within this teaching. Our interest is, as it were, to offer a critical appraisal of the landscape in which such trainees are operating, and to discuss issues relating to the design of that landscape, insofar as others can influence or seek to influence that design.

The trainees are choosing their landscape as it were but there are issues of access and alternative styles of living within it. In responding to their calling it is not simply enough to want to be a teacher. There is a need to be accredited if they are to stand a chance of securing a job and the process of accreditation brings with it a host of demands that the aspiring teacher will need to meet. We focus on how we might locate their voices at points along the way in the training process and how these voices adapt to include more of the official language required of them and how, in due course, this language becomes part of them. By focusing, in particular, on trainee teachers' own accounts, the book examines how such trainees make the transition into professional teaching. It further considers the influences which impact on the trainee during this period, such as university tutors, practice-school teachers, government policy, curriculum materials etc.

To summarise, the book is primarily concerned with examining how trainee teachers conceptualise their own professional development from the time they enter university on a four-year course as prospective initial teacher education students through to their first year of teaching in primary school. It has a particular focus on how they understand mathematics and how they understand their own teaching of the subject in schools. It offers both empirical and theoretical perspectives.

Empirically, the book draws, in particular, on two studies conducted by the authors, funded by the UK Economic and Social Research Council, spanning a four-year period. Both of these studies were concerned with the professional development of trainee teachers with a particular focus on their phenomenological experience of the training process. Two groups of around thirty students were interviewed at different stages of their training. These studies took place at a time of

great change in English schools. This change comprised a major programme of curriculum reform in which new regulative policies for the teaching of mathematics took centre stage. The *National Numeracy Strategy* (Department for Education and Employment, 1999), for example, offered a radical re-conception of classroom practice in mathematics in which specific guidance was offered. The studies pointed to this being seen in a positive light by teachers in primary schools, since it provided clear guidance in an area where many such teachers experienced their own anxieties in relation to the subject (McNamara and Corbin, 2001). Some point to it being a trigger to creativity although some others see it as a possible challenge to their own professional autonomy. The jury is still out as regards longer-term benefits in respect of pupil outcomes, although early indications suggest that the initiative has had limited impact on student test scores (Brown, Askew, Rhodes, Denvir, Ranson, and Wiliam, 2003).

Theoretically, the book draws on recent work in the field of psychoanalysis, and, in particular, the work of Slavoj Žižek, a Slovenian commentator influenced by the Freudian psychoanalytical work of Jacques Lacan. This provides an approach to examining how individual trainee teachers encounter the social framework in which they operate. In tackling this, we consider the “technologies of self” that produce teachers in schools. Additionally, we look at an approach to theorising our empirical findings that locates the discursive formation of school mathematics. We conclude by looking at how policy, school mathematics and research might be conceptualised.

The book seeks to discuss the findings of the two studies in relation to a number of tasks. Firstly, we are keen to present an account of how trainee teachers understand their own journey into teaching mathematics in the primary school. Secondly, we wish to understand better the conception of mathematics in the primary school and how it might develop. Thirdly, we would like to offer some discussion of how official policy as presented in government initiatives impacts on such teachers. Fourthly, we are concerned with better understanding the role that research in mathematics education might have in accounting for the process of trainees becoming teachers in the primary school and in stimulating development in this area. Finally, we try to offer a theoretical frame that accommodates evolving and alternative conceptions of mathematics, how it is taught and the social parameters that guide these conceptions.

In Part One we offer a frame for examining how we might understand individual teachers grappling with the social definition of their professional task. Chapter Two opens our theoretical work with regard to how personal experience is reconciled with social demand, in conceiving school mathematics itself, in understanding how it might be taught and in deciding how teachers might be trained to teach it. Chapter Three introduces some recent theoretical models from contemporary psychoanalysis and social theory in providing a framework for discussing how trainee teachers construct their identities through the training process and in response to government policy frameworks. A key theme is that any supposed resolution of the conflicting demands trainees encounter is illusory and that trainees work at producing images of themselves to conceal continuing difficulties.

Part Two provides a description of the two empirical studies carried out by the authors in England: it focuses on the teacher training process at primary level and outlines some results. In Chapter Four we offer an account of recent education reforms in England to contextualise the empirical studies upon which we draw and document how regulative aspects of policy have shaped conceptions of teaching in schools. Chapter Five discusses research relevant to our concern with the process of initial teacher education. Chapter Six introduces the empirical studies themselves. Chapters Seven to Nine discuss the successive phases in the training process and each focuses upon a key transition point in the journey from school pupil of mathematics to primary teacher of mathematics. Chapter Seven focuses on trainees at the transition between school and the early stages of their training and explores trainees' beliefs and attitudes towards school mathematics and its teaching and how this shifts during the initial training period. Chapter Eight charts the tensions between university-based periods and school placements during the four years of training. Chapter Nine supplies an account of the trainees' transition from training into their first teaching appointment in school and explores their experiences upon their first appointment.

Part Three uses the empirical studies presented in Part Two as a resource in building more theoretical themes. It provides accounts of how we might understand new teachers and primary mathematics education. It considers how policy and research might be seen as being shaped around these. Chapter Ten revisits some of the theoretical themes of Chapter Three in the light of the empirical data. In particular, it provides examples of how trainee and new teachers produce an account of their professional practice against a backdrop of some unresolved issues. It further shows how the language of policy directives is appropriated by trainee and new teachers. And how they use this language to encapsulate their own personal experiences. Chapter Eleven seeks to discuss the data with view to preparing the ground for a more theoretical treatment of the social constitution of school mathematics. The chapter focuses on how trainee teachers discuss mathematics in the context of their own teaching and shows how school mathematics is a function of broader discursive practices. Chapter Twelve then offers a more theoretical account of how school mathematics has become "commodified" through social processes. We argue that this "commodification" is a symptom of social desires expressed through certain social assumptions about the nature of mathematics and the way it addresses those desires. We suggest that mathematics culture is more directly a function of this commodification, rather than the desires that led to this commodification. We conclude in Part Four by discussing key themes. Chapter Thirteen considers how we conceive policy. Chapter Fourteen concludes our thoughts on teacher development. Chapter Fifteen looks at how mathematics as a notion emerges from the training process. Chapter Sixteen addresses how we might move forward in understanding research in mathematics education.

PART ONE

IDENTIFYING WITH MATHEMATICS TEACHING

How do trainee teachers begin to think of themselves as teachers? And how do they change how they are, as they proceed through a teacher education programme into their first teaching position? This book addresses the issue of teacher identity from the point of view of these questions and it considers how regulative government impacts on this construction of trainee and new teacher identities. In this part, some theoretical apparatus will be offered. A hermeneutic account will be provided to enable an interface of individual and social perspectives. Further, some theory drawn from contemporary psychoanalysis will be used to show how identity might be understood and developed in the context of initial teacher education courses within English universities. The accounts of these teachers will be set against a backdrop of a policy environment in which external accounts of what teaching should be have been on the ascendance. In this scenario, teachers need to craft their understanding of their own professional role whilst attentive to the legislative frameworks through which their practice is increasingly understood.

The book is to some extent motivated by considering ways in which teachers might stick their heads above the parapet and speak more firmly in voices that might be claimed as their own. Nevertheless, the notion of such ownership brings its own problems. Given the complex nature of teaching and its depiction in socially derived discourses, there are difficulties inherent in offering a singular view of one's own participation. More generally, some postmodernist analyses dispute the individual's capacity to be aware of his or her own immersion in such discourses. Alternatively, there are some recent claims that a culture of cynicism prevails, in which, despite everyone knowing that they are governed through a matrix of ideological state apparatus (Althusser, 1971), their actions remain unaffected.

In this part of the book, we outline some of the theoretical approaches that will inform the arguments to be made later. We consider a frame that enables an analysis of how mathematics and its teaching manifest themselves differently in individual and social perspectives. The notion of "individual", however, is problematised in recognition that attempts at making distinctions between the individual and the social bring with them a host of difficulties with regard to teacher agency. The image of the lone teacher reflecting on her practice and building her control is challenged. The teacher, it will be argued, cannot easily separate her own aspirations from those that are demanded of her. The very definition of the individual human subject draws on socialised accounts of what it is to be human, or, more specifically, what it is to be a teacher.

In Chapter Two, we commence with a discussion of how interpretation theory permits an understanding of how individual and social perspectives on school mathematics might be reconciled through a frame that enables them to co-exist. Chapter Three meanwhile builds a more sophisticated account of identity. After briefly surveying a range of contemporary perspectives on how identity might be understood, it opts for an approach derived from the psychoanalytic work of Jacques Lacan and Slavoj Žižek. This approach allows us to examine why teachers *choose* to tell a particular version of events, and how this choice predicates a selective account governed by the teacher's own self image.

CHAPTER TWO

TOWARDS RECONCILING INSIDER AND OUTSIDER PERSPECTIVES

1. INTRODUCTION

A key assumption at the commencement of our study was that there are many influences on trainee and new teachers' conceptions of mathematics. These influences emerge from a variety of culturally based assumptions as to the nature of mathematics and the associated forms of accountability they produce. We shall be suggesting that a number of difficulties arise from inconsistencies between alternative constructions of mathematics, the teaching of it, the perspective we assume in describing this teaching, and the issues underpinning the teacher training process. A central issue, as we shall see, relates to how such trainees and new teachers begin to reconcile their own sense of what mathematics is with how it might be taught, within the external demands they face from a variety of sources.

There are, in this respect, two journeys being undertaken simultaneously during the training process. The first journey is the path the teacher follows in constructing her way forward into being a teacher, pursuing the quest of meeting personal aspirations. The second journey is how the official story portrays this developmental sequence as a set of criteria to be fulfilled. How do these stories co-exist and in which ways do they intersect? How do they knowingly and unknowingly support each other and resist each other? In particular, how do understandings of mathematics emerge from each? Mathematics, understood in a more traditional way, we shall later suggest, has had a tendency to be drowned out in the bustle of different agencies selling their wares to trainee teachers as they pass through their training.

In the first journey the survival of mathematics as a discipline must depend to a large extent on the trainee wanting it to survive in her story. It could be all too easy to downgrade mathematics to "just one of the subjects that I have to teach". For those with uncomfortable memories of mathematics in their own schooling, this might be an easy option. A key motivation of this research was to address questions such as: how then might the trainee be assisted in advocating mathematics a little more strongly? How might the training process, with its multiple objectives and attendant budgetary and time constraints, impact a little more on the students' inner motivations to work with the subject?

In the second journey the trainee is rather more like a passenger insofar as the government, in allegiance with schools and universities, is delineating the route to be taken, and the things to be collected along the way. Recent reform has seen the British government wrestle with teachers and teacher education providers generally in deciding the content of the curriculum and the style in which it is delivered. The resulting package, to be outlined in Chapter Four, is a set of prescriptive guidelines that specify that school mathematics should be called numeracy and legislate what

must be taught according to a highly specific National Curriculum (Department For Education, 1995, revised Department for Education and Employment, 1999). They prescribe how lessons should be administered in the National Numeracy Strategy (Department for Education and Employment, 1999) and they issue statutory guidance on how trainees should be trained to administer them (National Curriculum for Initial Teacher Education (Department for Education and Employment, 1998c, updated Department for Education and Skills, 2002). In addition there have been supplementary tests in mathematical content for teachers entering the profession (Numeracy Skills Test (Teachers Training Agency, 1999)) over and above those specified in the university entry requirements. It seems that the government in policing the teaching of school mathematics is taking few risks. Or, at least, there has been much investment in policies that adopt top-down prescription for teachers in the classroom and the universities that train them for that job. The government then increasingly sees itself having a role in guiding, if not regulating, teachers in meeting the government's own criteria in defining educational objectives. The promotion of mathematics as a school subject is largely down to official conceptions of what that is and held in place by regulation. It may be, for example, that the government's promotion of mathematics as a discipline is a result of its perceived economic benefit - a criterion that does not necessarily lead to a version of mathematics that pleases everyone. From this perspective our research was motivated by the question: how might government policy be constructed to embrace a broader understanding of mathematical learning?

These two journeys presently appear to be happening at a time when new understandings of professionalism and managerialism are impacting on public conceptions of the teacher's role in English schools. Presently, external descriptions are being privileged over personal motivations. The personal motivations, characteristic of the first journey, seem, ever increasingly, to be expressed in terms of fulfilling the social requirement of the second journey. In this book we seek to examine these two journeys, or perhaps alternatively, account for "the" journey undertaken by trainee teachers from two perspectives. But in centring itself in a project concerned with sharpening the definition and objectives of research in mathematics education it sides with the teacher pursuing the development of her own professional voice. It thus privileges creating a better understanding of how teachers might be equipped to undertake the first journey and thus assert their own voices rather than being concerned with saying how guidance should be framed to steer the second journey.

Nevertheless, we do not see ourselves as liberators of oppressed teachers seeking release from totalitarian structures. Rather, we recognise that the structures often meet the demand of teachers themselves, providing support in areas where they lack confidence. Also, the official version of events can easily become the common sense of the day. Yet, we do see our research task as being to challenge the boundaries of this. We, for example, investigate the claim that the teachers' acceptance of the rulebook is a consensual downgrading of professional ambition. The very fantasy of a quick fix in "raising standards", "redefining professionalism", securing an "evidence base" in research, seems to appeal to teachers and their employers alike. We shall later consider Žižek's work on psychoanalysis (e.g. 1989)

where he argues that the seduction of an overarching rational structure guiding practice can provide a fetishistic displacement for the desires we wish to satisfy. Such compliance, he argues, can give rise to particular forms of enjoyment. Teachers, for example, may secretly like the rules they have to follow as it can give them a clear framework to shape their practice. Similarly, even though people may know that their actions do not make sense that does not stop people doing them in the absence of clear alternatives. Žižek argues that a culture of cynicism prevails where there is an acceptance that actions by individuals do not make much difference (Myers, 2003). Laclau and Mouffe (2001) argue that there are now too many versions of life for one centralised rational structure to have credence, but that this very complexity activates the desire for simple solutions. Governments in particular need to be able to present policies in clear terms no matter how unclear or contradictory the underlying premises might be. How might researchers in mathematics education develop a language that resists the onslaught of simplistic solutions and drape common sense over a more complex composite of rationalisations?

We commence with an outline of three dualities that offer alternative perspectives on mathematics, its teaching and how teachers are trained. This is followed by an outline of the hermeneutic theory that will underpin aspects of the study. The remainder of the chapter deals with a more detailed account of the dualities.

2. THREE DUALITIES

In Chapter Three we shall seek to present a theoretical approach that will assist us in considering how the individual trainee teacher manages this transition in terms of how they see their own emerging sense of identity as a teacher. We shall consider how the multiple demands might be combined in moving towards a coherent account of professional functioning. We shall later seek to shed light on the way in which school mathematics is derived through this process. But for now we seek to lay the ground for this later discussion. We shall tackle this by introducing three dualities through which we shall open our analysis:

- a) Duality One - phenomenological/ official versions of mathematics. The possible conflict between the trainee teacher's perspective on the mathematics they are engaged in and the way in which that mathematics is specified in curriculum documentation. The distinction between "what you see" and "what you are meant to see".
- b) Duality Two - discovery/ transmission conceptions of mathematics teaching. The possible conflict between seeing the teacher's task as enabling children to build their own mathematical thinking or seeing the task as ensuring that pupils attain requisite skills.
- c) Duality Three - perceptual/ structural conceptions of the training process. The possible conflict between the trainee's personal aspirations in respect of their professional training and the official demands they face.

Each of these three dualities can be seen as potentially dichotomous or conflicting and may often be experienced as such. They each comprise a first item rooted in an individual insider's perspective and a second item implying a more socially constructed overview. In each case, the first item is spoken of in qualitative terms, whilst the second requires a more "objective", or structural style of analysis. For each duality we shall explore how possible dichotomies might be resolved through adopting a hermeneutic perspective. This will be achieved by highlighting how the first item can be seen in the second and vice versa. We shall discuss these in turn shortly. We shall commence, however, with a brief account of the hermeneutic approach we intend to follow.

3. UNDERSTANDING AND EXPLANATION

An approach to using hermeneutics in mathematics education has been developed extensively elsewhere (Brown, 2001). An introductory account of alternative models of hermeneutics for educational research is also available (Brown and Higgs, 2004). For our purposes here now our pursuit of this will be modest. Essentially hermeneutics might be understood as the theory of interpretation as exemplified in the work of Paul Ricoeur (e.g. 1981). A central concern is with how we, as humans, make sense of the flow of our experience. What difficulties, for example, do we face in seeking to encapsulate experience in a set of words? Within mathematics this could be the difficulty of representing mathematical thought in some symbolic or linguistic expression. Ricoeur (1984) has written extensively about time and narrative, arguing that time is a function of the way in which experience is organised through narrative accounts of this experience. Hermeneutic analysis is often oriented around the notion of the *hermeneutic circle*. An example of such a circle offered by Ricoeur (1981) relates to the interplay between understanding and explanation. Understanding is continuous in time, forever susceptible to temporal disturbance. Meanwhile, explanation is often encapsulated in a form of words and as such is fixed in time and discrete. How does our understanding (of our experience) get translated into an explanation? Similarly, how do our explanations then condition subsequent understandings?

In the situation we wish to examine here we are concerned with how individual humans interact with social structures. Specifically, how do teachers interpret social structures and enact them in their own "individual" teaching practice? Social understandings of school mathematics and its teaching, we suggest, are reified in the apparatus of schools, policies and associated practices. Individual teachers are obliged to "speak" understandings of these social structures through their own voice. That is, their individual practices as teachers are recognised and assessed through the filter of more collective understandings of the teachers' professional task. Thus collective social practices shape the practices of individual teachers. But the summation of individual practices comprises the collective social practices. Policy directives offered by government will seek to impact on collective practices but this impact will always be a function of how those collective practices are currently