

BISHOP GROSSETESTE UNIVERSITY COLLEGE LINCOLN

IDENTIFYING DEEP SUBJECT KNOWLEDGE

**An evaluative study of the nature of
primary teachers' deep subject knowledge
when teaching mathematics**

**Being a dissertation submitted in partial fulfilment of the requirements
for the Degree of MA in Education**

Paul Broadbent B.Ed Dip Maths

March 2012

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Abbreviations

AST	Advanced Skills Teacher
BERA	British Educational Research Association
BMK	Basic Mathematical Knowledge
CAT	Credit Accumulation and Transfer Scheme
CK	Curricular Knowledge
CPD	Continuing Professional Development
DCSF	Department for Children, Schools and Families
DES	Department of Education and Science

DfE	Department for Education
DfEE	Department for Education and Employment
DSK	Deep Subject Knowledge
ETS	Excellent Teacher Scheme
HEI	Higher Education Institutions
ITT	Initial Teacher Training
KS	Key Stage
KLM	Knowledge of Learning Mathematics
KTM	Knowledge of Teaching Mathematics
LA	Local Authority
MaST	Maths Specialist Teachers Programme
NCETM	National Centre for Excellence in the Teaching of Mathematics
PCK	Pedagogical Content Knowledge
QTS	Qualified Teacher Status
RECME	Researching Effective CPD in Mathematics Education
SCK	Specialised Content Knowledge
SMK	Subject Matter Knowledge
TDA	Training and Development Agency

Ethical Declaration

I confirm that I have read the Bishop Grosseteste University College Research Ethics Policy and adhered to the guidance.

Signed

Paul Broadbent

I declare that the work is my own and that all sources have been acknowledged.

Signed

Paul Broadbent

Abstract

The focus of this study is to identify the characteristics of primary teachers' subject knowledge of mathematics and to ascertain the nature of *deep* subject knowledge.

A weakness in subject knowledge is an issue in primary schools, particularly in the teaching of mathematics. The Williams Report (2008) based key recommendations around this concern and in response a Masters-level Maths Specialist Teachers Programme (MaST) was introduced nationally in 2010. Selected teachers train to become specialists in primary mathematics teaching, with a stated aim of the MaST programme to develop and secure deep subject knowledge in its participants.

Following a review of literature and analysis of the characteristics of subject knowledge, a *Deep Subject Knowledge* model was designed and used as an analytical framework to collect evidence of subject knowledge. Data was gathered within lesson observations and through interviews from a sample group of three teachers on the MaST Programme. The four levels of Kirkpatrick's layered evaluation model were then used to evaluate the impact of the MaST Programme on the teachers' subject knowledge, with the results organised as three case studies.

An outcome of the study is the development of a framework based upon the *Deep Subject Knowledge* model that can now be used to identify and analyse the subject knowledge of teachers during classroom observation or interview. Using this framework, the study found evidence that deep subject knowledge is more likely to be developed through teaching experience, self-research and continuing professional development than through a high academic qualification in mathematics. The MaST Programme, as an example of a continuing professional development programme, was found to have had a positive impact on the deep subject knowledge of the participants. However, there was evidence of some limitations within the programme, particularly in the delivery of mathematics content beyond the primary phase. The study recommends that support should be given to teachers in the day-to-day management of a connectionist approach to teaching mathematics, and that any mathematics training given to primary teachers that is beyond the primary phase needs explicit connections made to the primary curriculum.