

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Frameworks for Thinking

This handbook focuses on the thinking processes necessary for learning. It provides descriptions and evaluations of 42 major frameworks including Bloom's taxonomy, de Bono's lateral and parallel thinking tools, Gardner's theory of multiple intelligences and Paul's model of critical thinking. Unique in its comprehensive coverage and interdisciplinary approach, it offers easy-to-grasp summary tables for each major theorist for speedy reference. The discussion of cognitive, emotional and social aspects of thinking and the nature of classification help the reader locate theories within a broader field of knowledge. Key concepts such as critical thinking, self-regulation and metacognition are examined from a range of perspectives. The handbook offers practical advice in the form of choices and recommendations for the use of frameworks in teaching, learning and assessment. A valuable tool for students needing to understand different ways of thinking, it will also be an essential resource for teachers, curriculum developers, researchers and policy-makers.

David Moseley is a former Reader in Applied Psychology at Newcastle University and has produced learning and assessment material for children and adults as well as publishing extensively on education and health.

Vivienne Baumfield is Senior Lecturer in Education at Newcastle University and has worked both in the UK and internationally on teacher training and professional development.

Julian Elliot is Professor of Education at Durham University. He has worked as a teacher and educational psychologist and from 2003–2005 was President of the International Association of Cognitive Education and Psychology.

Maggie Gregson is Senior Lecturer in post-compulsory Education at Sunderland University. Her research includes investigating models of reflection and 'thinking skills' interventions in schools and colleges in North East England.

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Steve Higgins is Senior Lecturer at Newcastle University and is Director of the Centre for Learning and Teaching. He has published books on developing thinking and the effective use of ICT in primary schools.

Jennifer Miller is Senior Lecturer at Newcastle University with responsibility for initial teacher education. She has acted as an advisor to local government on the use of ICT and has a special interest in e-learning.

Douglas Newton is an Emeritus Professor of Education at Newcastle University and has published award-winning work on teaching and understanding.

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Frameworks for Thinking

A Handbook for Teaching and Learning

David Moseley

Vivienne Baumfield

Julian Elliott

Maggie Gregson

Steven Higgins

Jennifer Miller

Douglas Newton



Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press

The Edinburgh Building, Cambridge CB2 2RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521612845

© David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins, Jennifer Miller and Douglas Newton 2005

This book is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2005

Printed in the United Kingdom at the University Press, Cambridge

A catalogue record for this book is available from the British Library

ISBN-13 978-0-521-84831-2 hardback

ISBN-10 0-521-84831-8 hardback

ISBN-13 978-0-521-61284-5 paperback

ISBN-10 0-521-61284-5 paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this book, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Cambridge University Press
0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton
Frontmatter
[More information](#)

Contents

<i>List of figures</i>	<i>page</i> ix
<i>List of tables</i>	x
<i>Notes on authors</i>	xii
<i>Foreword</i>	xv
<i>Acknowledgments</i>	xvii
Introduction	1
Selection of frameworks	2
Description and evaluation of individual frameworks	3
How to use this handbook	4
Overview of what follows	5
1 The nature of thinking and thinking skills	8
Perspectives on thinking	8
What is thinking?	10
Psychological perspectives	14
Sociological perspectives	16
Philosophical perspectives	18
Thinking skills in education	23
2 Lists, inventories, groups, taxonomies and frameworks	33
Bringing order to chaos	33
Objects of study	34
Utility	39
Examples	41
Conclusion	42

Cambridge University Press
0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton
Frontmatter
[More information](#)

vi | Contents

3 Frameworks dealing with instructional design	44
Introduction	44
Time sequence of the instructional design frameworks	47
Description and evaluation of the instructional design frameworks	49
Bloom’s taxonomy of educational objectives: cognitive domain	49
Feuerstein’s theory of mediated learning through Instrumental Enrichment	55
Gagné’s eight types of learning and five types of learned capability	62
Ausubel and Robinson’s six hierarchically-ordered categories	67
Williams’ model for developing thinking and feeling processes	71
Hannah and Michaelis’ comprehensive framework for instructional objectives	75
Stahl and Murphy’s domain of cognition taxonomic system	79
Biggs and Collis’ SOLO taxonomy: Structure of the Observed Learning Outcome	85
Quellmalz’s framework of thinking skills	90
Presseisen’s models of essential, complex and metacognitive thinking skills	94
Merrill’s instructional transaction theory	99
Anderson and Krathwohl’s revision of Bloom’s taxonomy of educational objectives	102
Gouge and Yates’ ARTS Project taxonomies of arts reasoning and thinking skills	112
Some issues for further investigation	117
4 Frameworks dealing with productive thinking	119
Introduction	119
Time sequence of the productive-thinking frameworks	120
Description and evaluation of productive-thinking frameworks	122
Altshuller’s TRIZ Theory of Inventive Problem Solving	122
Allen, Feezel and Kauffie’s taxonomy of concepts and critical abilities related to the evaluation of verbal arguments	128
De Bono’s lateral and parallel thinking tools	133
Halpern’s reviews of critical thinking skills and dispositions	140
Baron’s model of the good thinker	148

Cambridge University Press
0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton
Frontmatter
[More information](#)

	Contents	vii
Ennis' taxonomy of critical thinking dispositions and abilities	152	
Lipman's three modes of thinking and four main varieties of cognitive skill	157	
Paul's model of critical thinking	164	
Jewell's reasoning taxonomy for gifted children	170	
Petty's six-phase model of the creative process	174	
Bailin's intellectual resources for critical thinking	177	
Some issues for further investigation	183	
5 Frameworks dealing with cognitive structure and/or development	185	
Introduction	185	
Time sequence of theoretical frameworks of cognitive structure and/or development	187	
Description and evaluation of theoretical frameworks of cognitive structure and/or development	189	
Piaget's stage model of cognitive development	189	
Guilford's Structure of Intellect model	195	
Perry's developmental scheme	200	
Gardner's theory of multiple intelligences	206	
Koplowitz's theory of adult cognitive development	213	
Belenky's 'Women's Ways of Knowing' developmental model	217	
Carroll's three-stratum theory of cognitive abilities	221	
Demetriou's integrated developmental model of the mind	225	
King and Kitchener's model of reflective judgment	231	
Pintrich's general framework for self-regulated learning	235	
Theories of executive function	243	
Some issues for further investigation	248	
6 Seven 'all-embracing' frameworks	250	
Introduction	250	
Time sequence of the all-embracing frameworks	251	
Description and evaluation of seven all-embracing frameworks	252	
Romiszowski's analysis of knowledge and skills	252	
Wallace and Adams' 'Thinking Actively in a Social Context' (TASC)	259	
Jonassen and Tessmer's taxonomy of learning outcomes	266	

Cambridge University Press
0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton
Frontmatter
[More information](#)

Hauenstein’s conceptual framework for educational objectives	271
Vermunt and Verloop’s categorisation of learning activities	278
Marzano’s new taxonomy of educational objectives	282
Sternberg’s model of abilities as developing expertise	290
Some issues for further investigation	295
7 Moving from understanding to productive thinking: implications for practice	296
Overview	296
Thinking, learning and teaching	296
How are thinking skills classified?	297
Using thinking skill frameworks	300
Which frameworks are best suited to specific applications?	302
Developing appropriate pedagogies	304
Other applications of the frameworks and models	306
In which areas is there extensive or widely accepted knowledge?	308
In which areas is knowledge very limited or highly contested?	310
Constructing an integrated framework	312
Summary	317
<i>References</i>	319
<i>Index</i>	349

Figures

2.1	Groups within groups within a field	<i>page</i> 36
2.2	A part of a biological taxonomy of organisms	37
2.3	A taxonomy of behavioural disturbances	38
3.1	Williams’ model for encouraging thinking and feeling	72
3.2	The comprehensive framework for instructional objectives	76
3.3	Structural changes from Bloom to the Anderson and Krathwohl revision	105
4.1	Classifying a specific problem as an instance of a TRIZ generic problem, using TRIZ tools to identify a generic solution then translating it into a specific solution	123
4.2	Major modes of thinking (with criteria)	159
5.1	Guilford’s Structure of Intellect model	196
5.2	Demetriou’s general model for the architecture of the developing mind	226
5.3	Demetriou’s model of working memory	227
6.1	Romiszowski’s skill cycle	254
6.2	The TASC problem-solving model	260
6.3	The basic structure of Marzano’s theory-based taxonomy	283
7.1	An integrated model for understanding thinking and learning	314

Tables

3.1 Levels of detail in Bloom’s taxonomy (cognitive domain)	page 50
3.2 Map of cognitive strengths and weaknesses	59
3.3 The domain of cognition taxonomic system	81
3.4 The SOLO taxonomy levels, with descriptors and criteria	86
3.5 Quellmatz’s higher-order thinking strategies and processes	91
3.6 Presseisen’s taxonomy of essential thinking skills	95
3.7 Presseisen’s model of complex thinking skills	96
3.8 Presseisen’s model of metacognitive thinking skills	97
3.9 Taxonomy table with illustrative examples	106
3.10 The common framework used in the ARTS reasoning taxonomies	115
4.1 The CoRT thinking tools	134
4.2 De Bono’s six types of thinking	136
4.3 An example of one of the critical thinking skills specified by Halpern	141
4.4 Halpern’s categorisation of critical thinking skills	142
4.5 Cognitive strategies (formerly ‘elements of critical thinking’)	166
4.6 Jewell’s reasoning taxonomy for gifted children	171
4.7 Petty’s six phases with desirable accompanying mindsets	175
5.1 Koplowitz’s stages in adult cognitive development	215

Cambridge University Press
0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton
Frontmatter
[More information](#)

	List of tables	xi
5.2 King and Kitchener’s seven-stage model	232	
5.3 Pintrich’s phases and areas for self-regulated learning	236	
6.1 Romiszowski’s knowledge categories	253	
6.2 Romiszowski’s schema of skill categories	255	
6.3 Selected tools for effective thinking, using the TASC framework	261	
6.4 Elaborated descriptions of selected TASC skill areas	262	
6.5 Hauenstein’s abbreviated taxonomy of educational objectives	273	
6.6 A categorisation of learning activities	279	
6.7 Marzano’s six levels of educational objectives	284	
7.1 Problem-solving with young children	317	
7.2 Meeting key skills objectives	318	

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Authors

David Moseley leads and contributes to a number of research projects in the Centre for Learning and Teaching at the University of Newcastle upon Tyne (UK). As Reader in Applied Psychology, he was responsible for the postgraduate training in educational psychology for 21 years and since 1997 has initiated and managed several large-scale projects in educational and health contexts, working with voluntary bodies and public policy and research organisations. His publications include learning and assessment materials for use by children and adults, Open University course units and papers on: informatics; emotional intelligence; literacy and ICT; and constructs of teaching and learning. In 2002 he and his colleagues were funded by the national Learning and Skills Research Centre to evaluate theories of thinking skills – work which led to an ESRC-funded series of seminars and to the present handbook.

Vivienne Baumfield is a Senior Lecturer in Education at the University of Newcastle upon Tyne. Her research focuses on the role of enquiry in pedagogy and professional learning, with a particular interest in the potential of thinking skills interventions to provide stimulus and support for teacher change. As part of her work in the Centre for Learning and Teaching, she has lectured to networks of teachers and researchers interested in thinking skills and professional development in Hong Kong, Singapore, the Netherlands and Peru as well as across the UK. She is also involved in Initial Teacher Education and remains focused on the daily realities of teaching and learning in classrooms.

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Julian Elliott is a Professor of Education at the University of Durham. Formerly a teacher in mainstream and special schools, he subsequently practised as an educational (school) psychologist before entering higher education. His research and publication interests include: achievement motivation, the treatment of children's disorders, cognitive education and dynamic assessment, and teachers' skills of behaviour management. From 2003–2005 he was President of the International Association for Cognitive Education and Psychology, and is an Affiliate of the Centre for the Psychology of Abilities, Competencies, and Expertise at Yale University.

Maggie Gregson is a Senior Lecturer in post-compulsory Education in the School of Education and Lifelong Learning at the University of Sunderland (UK). Through her research, Maggie has explored models of reflection in relation to the social, cultural and psychological realities of helping student teachers to think critically and creatively about their practice. Her research includes an evaluation of 'thinking skills' interventions in schools and colleges across the North East of England. She is also involved in an evaluation of the impact of post-compulsory educational policy upon teaching, learning and assessment, especially in relation to adult literacy and numeracy.

Steve Higgins is a Senior Lecturer at Newcastle University and is Director of the Centre for Learning and Teaching. His research interests are in the area of developing children's thinking, ICT and mathematics in primary education. He has written a number of books on developing thinking and on the effective use of ICT in primary schools.

Jennifer Miller is a Senior Lecturer at Newcastle University with responsibility for initial teacher education. Educated in the USA and the UK her first degree was in librarianship and information science with further postgraduate study in business management. During her career, she has worked for local government in an advisory capacity supporting the use of ICT to improve teaching and learning. She is currently a member of the Centre for Teaching and Learning with research interests in e-learning and teaching for thinking.

Cambridge University Press
0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning
David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,
Jennifer Miller and Douglas Newton
Frontmatter
[More information](#)

Douglas Newton is an Emeritus Professor of Education at Newcastle University and a Professorial Fellow at Durham University. His research interests include the nature of understanding and how its thinking processes can be supported. He has published widely and his work has been translated into other languages.

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Foreword

I have two reproductions of great art on my desk. One is an inexpensive copy of Auguste Rodin's imponderable masterpiece, the Thinker, hunched over in his familiar pose that portrays 'every man' who is 'lost in thought'. The other 'objet d'art' is an inflatable replica of Edvard Munch's depiction of mental anguish in his renowned painting 'The Scream'. As I think about the task of integrating and classifying the last 50 years of theory and research in critical thinking, these two images come to mind and merge. In my mind's eye, I can see Rodin's inscrutable Thinker contort his face into that of the one depicted in 'The Scream' when the thoughtful, and presumably silent, Thinker is faced with organising and evaluating the literature on thinking skills. Fortunately, for those of us who care about improving how students think, we can all save our voices from the possible harm caused by a shrill scream because of the excellent work toward creating an organising taxonomy of thinking skills presented in *Frameworks for Thinking: A Handbook for Teaching and Learning*.

David Moseley and his able band of co-authors have boldly sorted through a mountain of literature to create a thinking skills taxonomy, so that we can identify what, when, and how well different methods and theories work to develop students' critical thinking abilities. Although it has always been true that the ability to think critically is necessary for democracies to flourish and for economies to succeed, modern technology now makes it necessary for increasing proportions of the population to develop their critical thinking abilities. In *Frameworks for Thinking: A Handbook for Teaching and Learning*, Moseley et al. provide a categorisation system that allows readers to understand

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

xvi

Foreword

essential elements among different ways of thinking about thinking and theories of teaching for thinking. They review the research designed to enhance thinking and identify the variables that promote better thinking—explicit instruction in thinking skills, emphasis on metacognition, good teaching, attention to dispositional aspects, and opportunities to practise across domains with collaborative group work. The authors took on a difficult task and performed a great service for all of us. Everyone who cares about the next generation of learners and thinkers and those who will teach them will find great food for thought in *Frameworks for Thinking*. It is one handbook that many people will keep handy. *Frameworks* is interesting reading for thinkers of all sorts.

Diane F. Halpern, PhD

Professor of Psychology

Claremont McKenna College

Past-president 2004,

American Psychological Association

Cambridge University Press

0521612845 - Frameworks for Thinking: A Handbook for Teaching and Learning

David Moseley, Vivienne Baumfield, Julian Elliott, Maggie Gregson, Steven Higgins,

Jennifer Miller and Douglas Newton

Frontmatter

[More information](#)

Acknowledgments

This handbook could not have been produced without the foresight and support of the Learning and Skills Development Agency (LSDA). They funded a large part of the research on which the handbook is based, seeking to provide a sound theoretical basis for post-16 teaching and learning. They hold the copyright of material taken (with permission) from our 2004 report: *Thinking skill frameworks for post-16 learners: an evaluation*.

Thanks are also due to two members of our original team (Mei Lin and Sue Robson) who have not contributed directly to the present volume. The Centre for Learning and Teaching at Newcastle University and the School of Education and Lifelong Learning at Sunderland University have provided support and encouragement throughout.

We are grateful to Diane Halpern, Robert Marzano, Paul Pintrich and Robert Sternberg for providing feedback on early drafts.