

Learning and Teaching Primary Science

Learning and Teaching Primary Science brings primary science to life through the stories and experiences of preservice and practising teachers. It explores the roles of the teacher and the learner of science within the primary school context, and examines the major issues and challenges for preservice teachers in science education, including: engaging diverse learners, utilising technology, assessment and reporting, language and representation, and integration in the 'crowded curriculum'.

Each chapter contains numerous examples, activities and reflective questions to help readers create relevant and meaningful lesson plans. Dedicated chapters for the areas of biology, chemistry, Earth and environmental science, and physics will give confidence to those without a science background. Practical approaches, strategies and skills are underpinned by relevant theories and evidence-based research.

Written by experts from Australia and New Zealand, *Learning and Teaching Primary Science* is an essential resource for those beginning their journey of teaching science in the primary school classroom.

Angela Fitzgerald is a lecturer at Monash University.

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Contents

List of figures	<i>page</i> xi
List of tables	xv
Contributors	xvii
Preface	xxi
CHAPTER 1 MAKING SENSE OF PRIMARY SCIENCE	1
<i>Kathy Smith and Angela Fitzgerald</i>	
Introduction	2
Valuing primary teachers' pedagogical expertise	3
Reframing the purpose and intention of primary school science	5
Science as a human endeavour	5
Developing scientific literacy	6
Changing the conversation: Acknowledging primary teacher expertise in teaching primary science	7
Summary	15
Questions for consideration	16
Further reading	16
PART I LOOKING AT LEARNERS OF PRIMARY SCIENCE	17
CHAPTER 2 BREAKING DOWN THE BARRIERS TO LEARNING SCIENCE	19
<i>Dayle Anderson and Azra Moeed</i>	
Introduction	20
Breaking down barriers to science teaching	21
Intrinsic barriers for teachers	22
Extrinsic barriers for teachers	27
Breaking down the barriers to student learning	32
Promoting student engagement	35
Summary	37
Questions for consideration	38
Further reading	38

Contents

CHAPTER 3	ENGAGING ALL LEARNERS IN SCIENCE	39
	<i>Kimberley Wilson and Brian Lewthwaite</i>	
	Introduction	40
	The science curriculum and diverse learners	40
	A pedagogical framework for culturally responsive teaching	45
	Summary	51
	Questions for consideration	52
	Further reading	52
	Acknowledgements	52
CHAPTER 4	MAKING LINKS BETWEEN SCIENCE AND THE LEARNER'S WORLD	53
	<i>Amy Cutter-Mackenzie and Marianne Logan</i>	
	Introduction	54
	Students' everyday worlds	55
	Everyday science	56
	Exploring everyday concepts alongside scientific concepts	57
	Sustainability as a socio-scientific reality	59
	Participatory case studies in practice	61
	Putting theory into practice in the primary classroom	67
	Summary	70
	Questions for consideration	71
	Further reading	71
CHAPTER 5	CAPTURING THE INTEREST OF THE TECHNOLOGICALLY SAVVY SCIENCE LEARNER	72
	<i>P John Williams and Mike Forret</i>	
	Introduction	73
	Positioning ICT	73
	Exploring ICT	74
	ICT-enhanced learning in science	76
	Illustrative examples	77
	Summary	86
	Questions for consideration	87
	Further reading	87

Contents

PART II	THINKING LIKE A TEACHER OF PRIMARY SCIENCE	89
CHAPTER 6	GRAPPLING WITH TEACHING SCIENCE AS CONTENT, PROCESS AND HUMAN ENDEAVOUR	91
	<i>Rena Heap</i>	
	Introduction	92
	Children's view of scientists	92
	Society's view of scientists	93
	The myths we can all hold	93
	So what is science?	94
	Science as content	96
	Science as process	101
	Science as a human endeavour, and the nature of science	103
	Summary	106
	Questions for consideration	107
	Further reading	108
CHAPTER 7	TOOLS FOR SUPPORTING THE LEARNING AND TEACHING OF SCIENCE	109
	<i>Karen Murcia</i>	
	Introduction	110
	Multimodal communication and science	110
	Representations of science	112
	Linking representations from everyday experience to an investigation	113
	Classroom action: Investigating forces in flight	114
	Classroom action: Explaining what causes day and night	117
	Classroom action: Representing tectonic plate movement	119
	Talking science	120
	Journaling in science	124
	Summary	125
	Questions for consideration	126
	Further reading	126

Contents

CHAPTER 8	LEARNING AND TEACHING SCIENCE THROUGH ASSESSMENT	127
	<i>Bronwen Cowie</i>	
	Introduction	128
	Purposes for classroom assessment	128
	Assessment in action within science inquiry	130
	Classroom assessment in the service of learning and teaching	132
	Thinking further about summative assessment	139
	Teachers make assessment happen	140
	Summary	142
	Questions for consideration	143
	Further reading	144
CHAPTER 9	INTEGRATION AND INNOVATION IN TEACHING SCIENCE	145
	<i>Wan Ng</i>	
	Introduction	146
	Curriculum integration	146
	Intradisciplinary science curriculum	147
	Interdisciplinary curriculum	151
	An inquiry-based approach to integrating learning across the curriculum: A case study with preservice primary teachers	155
	Benefits of and issues with integrated curricula	156
	Summary	160
	Questions for consideration	160
	Further reading	161
PART III	PUTTING PRIMARY SCIENCE INTO PRACTICE	163
CHAPTER 10	LIVING WORLD: LEARNING AND TEACHING BIOLOGY	165
	<i>Prem Kurup</i>	
	Introduction	166
	Situating biology learning and teaching in primary schools	166
	Curriculum requirements	167
	Introducing the 5E model	169
	A learning journey	171
	Summary	182
	Questions for consideration	183
	Further reading	183

Contents

CHAPTER 11	MATERIAL WORLD: LEARNING AND TEACHING CHEMISTRY	185
	<i>Gail Chittleborough and Peter Hubber</i>	
	Introduction	186
	Matter in the primary curriculum	187
	Ideas about matter	188
	Solids, liquids and gases: The three physical states of matter	198
	Teaching abstract concepts like matter	200
	Summary	206
	Questions for consideration	206
	Further reading	207
CHAPTER 12	PLANET EARTH AND BEYOND: LEARNING AND TEACHING EARTH AND SPACE SCIENCES	208
	<i>Leah Moore</i>	
	Introduction	209
	But I was terrible at science in school!	209
	Getting the balance right	210
	Teaching to the curriculum	211
	Summary	223
	Questions for consideration	224
	Further reading	225
CHAPTER 13	PHYSICAL WORLD: LEARNING AND TEACHING PHYSICS	226
	<i>John Kenny and Marj Colvill</i>	
	Introduction	227
	Forces in the Australian and New Zealand science curricula	227
	Using this chapter	227
	Exploring your own thinking about forces	228
	Looking for and representing forces in everyday life	230
	Building understanding about forces	231
	Key points to consider about forces	234
	Building on our understanding of forces: Balanced forces and stationary objects	235
	Floating objects: A further exploration of balanced forces	238
	Extending understanding: Force pairs	240
	Forces and motion	243

Contents

	Summary	246
	Further reading	246
CHAPTER 14	MAKING SCIENCE WORK IN THE PRIMARY CLASSROOM	247
	<i>Dawn Garbett</i>	
	Introduction	248
	High quality, effective science programs: Your role	248
	An example from my primary science education course	253
	Collaboration: An example from one school	255
	Beyond the classroom	257
	Summary	258
	Questions for consideration	258
	Further reading	259
	Glossary	261
	References	275
	Index	289

List of figures

1.1	A diagrammatical representation of teacher thinking about science learning and teaching	<i>page 9</i>
2.1	Teachers' reasons for learning science	23
2.2	Teachers' perceptions about features of science	24
2.3	Teachers' perceptions about practical barriers to teaching science	28
2.4	Use of informal units and comparative measurements: Child measuring with string	30
2.5	Use of informal units and comparative measurements: Child bouncing a ball	30
2.6	Children engaged in exploring feathers	33
2.7	A science table can generate student interest	35
2.8	A wonder wall encourages students to ask questions	36
3.1	Pedagogical framework for informing culturally responsive teaching of science	46
4.1	The ecological techno-subsystem	55
4.2	Hart's (1992) Ladder of Participation	60
7.1	Symbolic image of a molecule of water	112
7.2	Interactive digital bar graph with linked photo of the furthest-flying paper plane	115
7.3	Annotated image of airflow over an aeroplane's wing	116
7.4	A student's multimodal representation of day and night	117
7.5	3D model of plate movement	119
7.6	A multimodal science word wall combining objects, words and questions	125
9.1	One model of a solar cooker	154
10.1	An example of a TWLH chart	172
10.2	An example of a word wall (1)	172
10.3	An example of a word wall (2)	173
10.4	A student representation of the living world (1)	174
10.5	A student representation of the living world (2)	174
10.6	Example of a context related to exploring a local environment (1)	176

List of figures

10.7	Example of a context related to exploring a local environment (2)	176
10.8	Example of a fair test investigation examining the factors impacting on plant growth set up in a classroom	177
10.9	Example of a context for applying conceptual understandings and making informed decisions	179
10.10	Two preservice primary teachers working with primary-aged students on learning and teaching a biology unit of work (1)	181
10.11	Two preservice primary teachers working with primary-aged students on learning and teaching a biology unit of work (2)	181
11.1	The concept of material	189
11.2	A word wall in a Year 4 primary classroom	191
11.3	A diagram distinguishing pure and impure materials	192
11.4	Descriptions of the three physical states of a substance at the macroscopic level (what you see) and submicroscopic level (particles) – solid, liquid and gas	196
11.5	Work sample from a 10-year-old student, with observations about understandings of the properties of matter	200
11.6	Representation from a 10-year-old student of the mixing of salt with water	202
11.7	Representation from a 10-year-old student of the mixing of sugar with water	202
11.8	Report from a 10-year-old student on a disappearing handprint investigation	204
11.9	Responses from two 10-year-old students to two pre-test questions about water	205
12.1	The hydrologic cycle as drawn by Manu, a Year 4 (8-year-old) student from an Australian primary school	218
13.1	Representation of forces acting on a swivel chair (1)	232
13.2	Representation of forces acting on a swivel chair (2)	232
13.3	Representation of forces acting on a swivel chair (3)	233
13.4	Considering the forces acting on a basketball being held aloft	235
13.5	Considering the forces acting on a cup sitting on a table	236

List of figures

13.6	Representation of forces acting on a cup sitting on a table	236
13.7	Forces acting on a stationary ball	237
13.8	Forces acting on a falling ball	237
13.9	Considering the forces acting on a floating ball	238
13.10	Representation of forces acting on a floating ball (1)	239
13.11	Representation of forces acting on a floating ball (2)	239
13.12	Representation of forces acting on a floating ball (3)	240
13.13	Representation of the force pair present in a tug of war	240
13.14	Representation of forces acting in a tug of war game (1)	241
13.15	Representation of forces acting in a tug of war game (2)	241
13.16	Representation of forces acting on two interlocked hairbrushes	242
13.17	Representation of forces acting when opening a bottle	242
13.18	Tennis ball and ramp	243
13.19	Representation of the forces acting on a ball moving on different surfaces	245

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Frontmatter
[More information](#)

List of tables

3.1	Attributes of culturally responsive teachers of science	page 47
4.1	Examples of how hands-on activities can be implemented into the science curriculum with a context-based focus	69
6.1	Comparing the science components of the Australian and New Zealand curriculum documents	95
9.1	An example of intradisciplinary integration of science concepts associated with the <i>Sun</i> , based on the Australian and New Zealand curricula	148
9.2	An example of an interdisciplinary curriculum around the theme of the <i>Sun</i> for Year 3 students, based on the Victorian Essential Learning Standards (VELS)	152
9.3	Collective questions preservice teachers asked about corn and popping corn	157
9.4	Examples of topics and activities that could be integrated into the theme of <i>Corn and Popping Corn</i>	158
10.1	5E phases mapped against main objectives and appropriate activities	170
11.1	Australian Curriculum scope and sequence for <i>Chemical Sciences</i> : Foundation to Year 6	187
11.2	Selected content from the New Zealand primary science Curriculum: The <i>Material World</i> strand (Levels 1 to 4)	188
11.3	Mixtures and some possible constituent substances	193
11.4	Descriptions of observed phenomena and explanations using the particle model	196
11.5	Samples of students' observations from their science journals	199
12.1	Australian and New Zealand Science Curriculum statements for Earth and space sciences in the foundation years of primary school	212
12.2	Australian and New Zealand Science Curriculum statements for Earth and space sciences in the early years of primary school	214

List of tables

12.3	Australian and New Zealand Science Curriculum statements for Earth and space sciences in the middle years of primary school	218
12.4	Australian and New Zealand Science Curriculum statements for Earth and space sciences in the senior years of primary school	221
13.1	Your prior knowledge about forces	228

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Preface

When I first started the development of this book, my intent was to deliver a ‘good news story’ about primary science learning and teaching. The focus was to tap into what primary school teachers characteristically do really well – that is, create conditions for meaningful learning – and apply this lens to the science learning area. This, in fact, is not a difficult job. Science sits comfortably in primary classrooms because as a discipline it requires a sense of curiosity and creativity; it promotes questioning and invites critical examination; it has the potential to spark the interest of an individual, but also requires a collaborative approach. Essentially, the learning of science is perfectly suited to the ways in which primary school teachers already approach their practice and nurture student learning. However, such rich approaches have been continually challenged by age-old traditions which perpetuate the idea that school-based science learning and teaching should be about a teacher delivering content as a series of indisputable facts for students to memorise and regurgitate. As a result, teachers have been led to believe, particularly through their own educational experiences, that this teacher-directed model is how science should be learnt and taught. Unfortunately, compliance with this thinking has produced a version of school science that is largely out of step with the ways scientists actually practise science, and with the ways in which we best learn.

This book aims to open up and challenge primary school teachers to rethink such traditional approaches to science learning and teaching. Whether they are at the start of their journey to becoming a teacher or towards the end of their career, the book encourages all primary teachers to reconnect with pedagogy that enhances effective learning in science. At the heart of the stories presented here is a belief that primary teachers can move beyond traditional notions about what science in schools *should* be, to recognising that what they currently value in their teaching practices is applicable and relevant to what science learning and teaching *could* be.

The authors present stories from people across Australia and New Zealand who are passionate about primary science education and interested in sharing their expertise and experiences with primary school teachers. These stories have evolved into three distinct sections: looking at learners of primary science; thinking like a teacher of primary science; and putting primary science into practice.

In looking at what it means to be a primary science learner, Dayle Anderson and Azra Moeed’s chapter acknowledges the barriers that may be faced when engaging students with science (chapter 2). Equally important is the need to consider the ways in which the diverse needs, experiences and backgrounds of students can be embraced and appropriately incorporated into our science practices, as outlined by Kimberley Wilson and Brian Lewthwaite (chapter 3). To assist in addressing these needs, Amy Cutter-Mackenzie and Marianne Logan outline ways of making science

Preface

relevant for learners and their lives (chapter 4), and John Williams and Mike Forret tap into the technologically savvy nature of students (chapter 5).

To think like a primary science teacher requires some grounding in the nature of science as a conceptual area, a process and a construct that is influenced by human endeavour, which is provided through Rena Heap's work (chapter 6). From this point, Karen Murcia considers some of the teaching tools or approaches that best support science learning and teaching (chapter 7) and Bronwen Cowie explores the important role that assessment can play in developing science understandings and knowledge (chapter 8). Particularly important for primary school teachers is the ability to integrate and innovate the curriculum within their classrooms – a challenge which Wan Ng examines in relation to the science learning area (chapter 9).

In putting science into practice in the primary classroom, the focus turns to the four overarching conceptual areas of science. Different terminology is used for these in the Australian and New Zealand curriculum documents, but essentially they are biology (chapter 10), chemistry (chapter 11), Earth and environmental science (chapter 12) and physics (chapter 13). These chapters, developed by Prem Kurup; Gail Chittleborough and Peter Hubber; Leah Moore; and John Kenny and Marj Colvill, respectively, offer practical approaches and strategies for implementing coherent lessons across the primary school years relevant to these particular conceptual areas. They are aimed at developing appropriate procedural skills as well as raising awareness about the values and attitudes that impact on our science understandings.

The introduction and conclusion provide bookends for these chapters. Kathy Smith and I set the scene by inviting a rethink of the purpose of science education in primary schools (chapter 1), while Dawn Garbutt assists in imagining what the stories shared throughout this book might mean for classroom practice (chapter 14).

As you read through the book, you will recognise the unique contribution that arises from this particular combination of voices, backgrounds and experiences, but in creating the overall story, they contribute to one key message: be open to thinking differently about primary science. As a teacher of primary school science, you are also a learner. This, of course, can be daunting, confronting and uncomfortable; however, you need to be willing to shift your thinking, embrace change and expect the unexpected. By applying the ideas explored through this book to an already well-developed understanding of appropriate primary teaching practices, you will find that you are able to bring science learning and teaching to life for your students and yourself.

Angela Fitzgerald
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