

Contents

FOREWORD BY DR ALAN FINKEL	v
LIST OF CONTRIBUTORS	xii
ACKNOWLEDGEMENTS	xiv

Introduction	1
<i>Coral Campbell, Christine Howitt and Wendy Jobling</i>	
Science in early childhood	1
Chapter summaries	2
Reference	5

PART 1 WHAT INITIAL INFORMATION SHOULD I KNOW TO TEACH SCIENCE? 7

CHAPTER 1	The place of science in the early years	9
	<i>Coral Campbell and Christine Howitt</i>	
	What does science look like in the early years?	10
	What is science?	11
	Science and creativity	13
	The importance of science in the early years	14
	Children's capacity for science	15
	Conclusion	15
	References	17

CHAPTER 2	Science and the national Early Years Learning Framework	18
	<i>Andrea Nolan</i>	
	Evolution of the framework	19
	The EYLF structure and implications for teaching and learning in early years settings	20
	Valuing different views	22
	Science and the EYLF: learning outcomes	25
	Conclusion	31
	Acknowledgement	31
	References	32

CHAPTER 3	Science in the Australian Curriculum	34
	<i>Kathryn Paige</i>	
	A short history of the Australian Curriculum	35
	Content structure of the Australian Curriculum: Science	36
	General capabilities	44
	Cross-curriculum priorities	48
	Conclusion	52

	Acknowledgement	52
	References	53
CHAPTER 4	Learning theories related to early childhood science education	54
	<i>Coral Campbell</i>	
	Children's cognitive development	55
	Theories of learning	57
	Everyday concepts, science concepts and learning theories	63
	Conclusion	67
	References	68
PART 2	HOW CAN I ENHANCE CHILDREN'S LEARNING OF SCIENCE?	71
CHAPTER 5	Approaches to enhance science learning	73
	<i>Coral Campbell and Kate Chealuck</i>	
	The importance of prior knowledge	74
	Approaches to enhance children's science learning	74
	Strategies to enhance science learning	80
	Probing for understanding	82
	Conclusion	88
	References	89
CHAPTER 6	Teaching science inclusively with a special focus on Indigenous learning	90
	<i>Kate Chealuck and Coral Campbell</i>	
	Inclusive practice	91
	The nature of science in society: incorporating inclusive practices	92
	Adopting critical equity practices in early childhood science	95
	Cultural understandings: the importance of Indigenous knowledge	99
	Conclusion	105
	Acknowledgement of country	105
	References	106
CHAPTER 7	Using play pedagogy in early years science education	108
	<i>Jane Johnston and Coral Campbell</i>	
	The importance of play	109
	Types of play and how they support child development	110
	Structured play in the early years curriculum	115
	The importance of play pedagogy in the first years of school	117
	Play pedagogies to support science education	118
	Conclusion	121
	References	122

CHAPTER	8	Enhancing young children's science identity through pedagogical practices	124
		<i>Elaine Blake and Christine Howitt</i>	
		Science identity in young children	125
		Pedagogy	125
		The relationship between educator beliefs and pedagogy	126
		Exploring pedagogical practice in developing young children's science identity	127
		Enhancing young children's science identity through pedagogical practices	133
		Conclusion	134
		References	135

CHAPTER	9	STEM education in early childhood	136
		<i>Christine Preston</i>	
		Definition and importance of STEM education	137
		Elements of STEM in children's play	139
		Using STEM education to enhance children's understanding of the world	142
		Recognising opportunities for STEM learning experiences	145
		The role of digital technologies in STEM learning experiences	148
		Conclusion	152
		References	153

PART 3 HOW CAN I USE THE LEARNING ENVIRONMENT TO ENHANCE CHILDREN'S SCIENCE UNDERSTANDINGS? 155

CHAPTER	10	The science learning environment	157
		<i>Coral Campbell, Wendy Jobling and Christine Howitt</i>	
		Learning environments	158
		Supporting science learning through the physical environment	158
		Preparing science activities for teacher-led or child-instigated learning	162
		Using digital technology as a teaching tool or for children's learning	166
		The built environment	167
		Conclusion	168
		Acknowledgement	168
		References	169

CHAPTER	11	Learning science in informal contexts: the home and community	170
		<i>Jill Robbins</i>	
		The importance of early childhood recollections for science learning	171
		Research on science in the home and community	172
		Implications for practice	174
		Everyday and scientific (or academic) concepts	176
		Using the science curriculum to inform teaching	178
		Establishing relationships: working together to support learning in science	182

	Conclusion	185
	Acknowledgement	185
	References	186
CHAPTER 12	Learning science in outdoor settings	188
	<i>Coral Campbell</i>	
	Understanding 'outdoor settings'	189
	Science play and learning in natural settings	194
	The educator's role in promoting science learning in outdoor settings	198
	Connecting science and environmental education	201
	Conclusion	203
	References	204
PART 4	HOW DO I PLAN AND ASSESS IN SCIENCE?	207
CHAPTER 13	Planning for teaching science in the early years	209
	<i>Christine Howitt</i>	
	Whole-school or centre planning	210
	Educator school-term planning	211
	Planning with the 5E model	213
	Early learning centre topic planning	216
	Conclusion	219
	Acknowledgement	220
	References	221
CHAPTER 14	Intentional teaching of science	222
	<i>Christine Howitt</i>	
	What is intentional teaching?	223
	Intentional teaching and play	225
	Lesson planning for intentional teaching	229
	Conclusion	233
	References	234
CHAPTER 15	Observing, assessing and documenting science learning	235
	<i>Coral Campbell</i>	
	Children's learning	236
	Observing science learning	237
	Documenting and assessing	239
	Documentation of science learning	246
	Analysing children's understanding in science	250
	Conclusion	254
	Acknowledgement	255
	References	256

CHAPTER	16	Science education professional learning through reflective practice	258
		<i>Christine Howitt and Coral Campbell</i>	
		Science education professional learning	259
		Reflective practice and critical reflection	259
		Strategies for reflective practice	260
		Science education pedagogical content knowledge	265
		Strategies to enhance science education PCK	269
		Conclusion	270
		References	271
APPENDIX 1:	Activity plans		272
APPENDIX 2:	Examples of simple science statements or concepts		280
INDEX			291