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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Contributors

About the editor: Angela Fitzgerald is currently employed as a lecturer at Monash University where she specialises in science teacher education and classroom-based research. She worked as a secondary school science teacher in country Victoria before moving to Western Australia to complete her PhD studies in primary science education.

Dayle Anderson combines her passion for primary teaching and science in her work as a senior lecturer in primary science and mathematics education at Victoria University of Wellington. Her doctorate and current research focus on primary science learning and teaching. She worked as a biochemist before moving into primary teaching.

Gail Chittleborough is a senior lecturer in science education at Deakin University. She is a chief investigator on two Australian Research Council grants in science education. Gail is part of the Deakin University science education team who wrote and delivered two professional development programs that focus on building teachers’ capacity in teaching science.

Marj Colvill is currently employed by the Tasmanian Department of Education as a Principal Education Officer. She has worked in many Tasmanian primary schools and has also lectured in primary science at the University of Tasmania. She has been recognised for excellence in primary science teaching and holds a doctorate of science education.

Bronwen Cowie is the director of the Wilf Malcolm Institute of Educational Research, The University of Waikato. Her research interests include formative assessment, culturally responsive pedagogy and curriculum implementation. Her research has spanned projects that include long-term national evaluation studies and indepth classroom studies involving surveys, focus groups and observation.

Amy Cutter-Mackenzie is an Associate Professor in Sustainability, Environment and Education in the School of Education at Southern Cross University. She is also the Director of Research for the School of Education. Amy commenced her career as a primary school teacher in Queensland and later moved into academia after completing her PhD.

Mike Forret holds a joint position in the Faculty of Education and the Technology, Environmental, Mathematics and Science Education Research Centre at the University of Waikato. He has a background in teaching secondary science and his research interests lie in developing effective learning environments in general, and digitally mediated learning environments in particular.

Dawn Garbett is an Associate Professor and science teacher educator at the University of Auckland. She teaches early childhood, primary and secondary preservice teachers.
Contributors

research interests are in practitioner research and self-study. In 2008, she won a national Tertiary Teaching Excellence award for sustained excellence.

**Rena Heap** has been lecturing at the University of Auckland since 2004, during which time she has won Faculty, University and national awards for teaching. She previously taught across a wide range of levels in primary schools throughout New Zealand. Rena specialises in science education and practitioner research.

**Peter Hubber** is currently a senior lecturer in science education at Deakin University. He has 25 years experience as a secondary science teacher. Apart from teaching in the preservice and postgraduate teaching programs, Peter has a research profile in the role of representation in the teaching and learning of science.

**John Kenny** is a senior lecturer in science education at the University of Tasmania. He taught physics and science in Victorian schools before becoming an education consultant. John gained his PhD from RMIT University in 2005 and moved to UTAS to re-develop the primary science courses in the teacher education programs.

**Prem Kurup** is currently a lecturer in science education at Latrobe University, Bendigo, teaching primary science education units. Prem did his doctorate at Edith Cowan University in Perth, and has secondary and tertiary science teaching experience in Australia and India.

**Brian Lewthwaite** is an Associate Professor in teacher education at James Cook University in Townsville, Queensland. His research interests include science education, teacher professional development, and learning environment research. Brian has worked on a number of long-term science education research projects with teachers, students and community members in Aboriginal communities.

**Marianne Logan** is currently working as a lecturer in early childhood and primary science and technology education. She has conducted research in the area of students’ attitudes to, and interest in, science. Marianne has a background in early childhood, primary and secondary science teaching, and completed her PhD at Southern Cross University (SCU).

**Azra Moeed** is a curriculum leader and senior lecturer in science at the Faculty of Education, Victoria University of Wellington. She taught in early childhood, primary and secondary schools before becoming a teacher educator. Her research interests include science education, science teacher education, and environmental education.

**Leah Moore** is a scientist and teacher, originally from New Zealand, now based in Canberra where she is an Associate Professor at the University of Canberra. She specialises in Earth
Contributors

and environmental science, and science teacher education. Leah is a member of the National Advisory Panel for Science for the development of the Australian Curriculum.

Karen Murcia is an Associate Professor in science education at Edith Cowan University, Convenor of the Mathematics and Science Teaching and Research Group, and Course Coordinator for Primary Education. She has an established track record of research related to science education, scientific literacy, and digital education technology and pedagogy.

Wan Ng is an Associate Professor in science education and technology-enabled learning and teaching at the University of New South Wales. She has 10 years of school teaching experience and specialises in both primary and secondary teacher education. She researches in technology-supported pedagogy, mainly in science and gifted education.

Kathy Smith is an education consultant undertaking various roles: science resource officer with the Catholic Education Office, Melbourne; project work with the Faculty of Education, Monash University; and school-based consultancy. She is also currently a PhD student at Monash University. Kathy is an experienced primary teacher and her research interests include teacher thinking, professional learning and pedagogy.

P John Williams is Director of the Technology, Environmental, Mathematics and Science Education Research Centre at the University of Waikato. As part of his work as an Associate Professor, he teaches and supervises research students in technology education.

Kimberley Wilson is a primary school teacher with postgraduate qualifications in Community Development. She has worked in partnership with the Edmund Rice Education Australia Flexible Learning Centre Network for the past five years in the context of a project titled ‘Re-Engaging Disadvantaged Youth Through Science’, funded by the Australian Research Council.
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 lead 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
Monash University
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