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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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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

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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.

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