

Contents

Part A Setting the Scene

- Chapter 1 Making it Tangible –
 Specifying Learning Outcomes in Science Education
Sascha Bernholt, Knut Neumann & Peter Nentwig 13

Part B The Big Picture

- Chapter 2 Moving Beyond Standards: How Can We Improve Elementary
 Science Learning? A German Perspective
Kornelia Möller, Ilonca Hardy & Kim Lange 31
- Chapter 3 Developing a Framework for Diagnostic Assessment of
 Early Science
Benő Csapó 55
- Chapter 4 The Design of an Assessment System Focused on Student
 Achievement: A Learning Sciences Perspective on Issues of
 Competence, Growth, and Measurement
James W. Pellegrino 79
- Chapter 5 Learning Outcomes in Ireland –
 Implications for the Science Classroom
Declan Kennedy 109
- Chapter 6 Assessing Professional Competences and their Development
 in Vocational Education in Germany – State of Research and
 Perspectives
Reinhold Nickolaus, Andreas Lazar & Kerstin Norwig 129

Part C The Devil in the Details

Chapter 7	Competencies: The German Notion of Learning Outcomes <i>Olaf Köller & Ilka Parchmann</i>	151
Chapter 8	Capturing the Diversity of Students' Competences in Science Classrooms: Differences and Commonalities of Three Complementary Approaches <i>Sascha Bernholt, Sabina Eggert & Christoph Kulgemeyer</i>	173
Chapter 9	Assessment of Standards-based Learning Outcomes in Science Education: Perspectives from the German Project ESNaS <i>Kerstin Kremer, Hans E. Fischer, Alexander Kauertz, Jürgen Mayer, Elke Sumfleth & Maik Walpuski</i>	201
Chapter 10	Standards, Competencies and Outcomes. A Critical View <i>Horst Schecker</i>	219
Chapter 11	The Development, Validation, and Implementation of Standards in Science Education: Chances and Difficulties in the Swiss Project HarmoS <i>Peter Labudde, Christian Nidegger, Marco Adamina & François Gingins</i>	235
Chapter 12	The Promise and Value of Learning Progression Research <i>Joseph S. Krajcik, LeeAnn M. Sutherland, Kathryn Drago & Joi Merritt</i>	261
Chapter 13	Using Learning Progression to Organize Learning Outcomes: Implications for Assessment <i>Xiufeng Liu</i>	285
Chapter 14	The Challenge of Alignment of Students' Learning Outcomes with Curriculum Guidelines, Instruction, and Assessment in Science Practice in Taiwan <i>Mei-Hung Chiu & Hui-Jung Chen</i>	303
Chapter 15	Learning Outcomes for Science in Australia: How Are They Defined, Measured, and Implemented? <i>Debra Panizzon</i>	341

Part D Perspectives from Different Countries

- Chapter 16 How Learning Outcomes in Science Are Specified and Measured in the English School System
Robin Millar, Mary Whitehouse & Ian Abrahams 367
- Chapter 17 An Examination of Turkish Science Curricula from a Historical Perspective with an Emphasis on Learning Outcomes
Alipaşa Ayas 399
- Chapter 18 Defining the Structure and the Content of a New Chemistry Curriculum in the Netherlands
Cris Bertona 425
- Chapter 19 Potential Learning Outcomes Inferred from French Curricula in Science Education
Patrice Venturini & Andrée Tiberghien 443
- Chapter 20 Item Construction for Finnish National Level Assessment in School Physics Without Pre-Defined Learning Outcomes
Jari Lavonen, Heidi Krzywacki & Laura Koistinen 477

Part E A Coda

- Chapter 21 Learning Outcomes in Science Education: A Synthesis of the International Views on Defining, Assessing and Fostering Science Learning
Knut Neumann, Sascha Bernholt & Peter Nentwig 501