## **Contents**

| Quality in practice-oriented research in science education (Intentions of the symposium)  Bernd Ralle & Ingo Eilks  | 1  |
|---|----|
| Quality in Action Research for classroom development  Herbert Altrichter  | 5  |
| Chemistry teachers' beliefs about teaching and learning of chemistry in the context of curriculum innovation in the Netherlands  Jan H. van Driel & Astrid M. W. Bulte              | 17 |
| Changing teachers' attitudes and professional skills by involving them into projects of curriculum innovation in Germany  Ingo Eilks, Ilka Parchmann, Cornelia Gräsel & Bernd Ralle | 29 |
| Transforming educational theory into usable knowledge: A case of coconstructing tools for lesson design and reflection  Fritz S. Staub  | 41 |
| The Cams Hill Science Consortium: An inter-institutional collaborative Action Research project in science education  John K. Gilbert & Matthew Newberry                             | 53 |
| Teachers research their students' understanding of electrical conductivity<br>Rachel Mamlok-Naaman, Oshrit Navon, Miriam Carmeli & Avi Hofstein.                                    | 63 |
| A teacher researcher group's exploration of chemical equations  John Oversby  | 73 |
| Teaching constructively: Implications and perspectives  Nicos Valanides   | 83 |
| IMST <sup>2</sup> (Innovations in Mathematics, Science and Technology Teaching) - An inter-universities project to develop science teaching in Austria <i>Karl Brachtl</i>          | 95 |

| Involving students in meaningful chemistry education by adapting authentic practices   |     |
|--|-----|
| Astrid M.W. Bulte, Hanna B. Westbroek, Lisette van Rens & Albert Pilot   | 105 |
| Emotional and cognitive aspects of learning: The ecological unit "Lake"  Christoph Randler & Franz X. Bogner   | 117 |
| From algorithmic LOCS teaching to HOCS learning – A paradigm shift: What does /should it take in practice-oriented research in STES education?  Uri Zoller | 125 |
| The role of research in a systemic approach to school development - Experiences from interdisciplinary school projects  Michael Schallies                  | 137 |
| Visual tools and science teachers' professional development  Ani Epitropova  | 147 |
| How student teachers teach difficult ideas in chemistry?  Declan Kennedy & Judith M. Bennett   | 157 |
| Approaches towards quality in practice-oriented research in science education (Reflections from the symposium)   |     |
| Ingo Eilks, Bernd Ralle, Albert Pilot & Nicos Valanides  | 167 |
| List of participants   | 171 |