# Contents

*Preface*  

**ONE**  
A Vision of Ambitious Science Teaching  
1

**TWO**  
Planning for Engagement with Big Science Ideas  
Core Practice Set #1  
19

**THREE**  
Talk as a Tool for Learning  
Productive Discourse, Part 1  
39

**FOUR**  
Encouraging More Students to Participate in Talk  
Productive Discourse, Part 2  
65

**FIVE**  
Eliciting Students’ Ideas  
Core Practice Set #2  
85

**SIX**  
Making Thinking Visible Through Models  
Modeling, Part 1  
111

**SEVEN**  
Allowing Students to Show What They Know  
Modeling, Part 2  
131

**EIGHT**  
Supporting Ongoing Changes in Thinking: Introducing New Ideas  
Core Practice Set #3  
151

**NINE**  
Supporting Ongoing Changes in Thinking: Activity and Sense Making  
Core Practice Set #3  
169
TEN  Supporting Ongoing Changes in Thinking: Collective Thinking 187
   Core Practice Set # 3

ELEVEN Making and Justifying Claims in a Science Community 199
   Scientific Argument

TWELVE Drawing Together Evidence-Based Explanations 215
   Core Practice Set #4

THIRTEEN Organizing with Colleagues to Improve Teaching 237

FOURTEEN Can We Be Ambitious Every Day? 257

APPENDIX A Coherence Between AST and Professional Standards for Practice 265

APPENDIX B Reminding Ourselves of the Bigger Picture of Instruction 269

APPENDIX C Taxonomy of Tools 275

APPENDIX D How to Help Students Understand the “What-How-Why” Levels of Explanation 277

APPENDIX E Rapid Survey of Student Thinking (RSST) Tool 281

APPENDIX F Supports for Students in Making Sense of Experimental Design and Purpose 283

APPENDIX G Supporting Explanation Writing 285

Notes 291

About the Authors 297

Index 299