a lesta de la seconda de la

3

- CONTENTS
 - A.T. Reporting the Econitic to the Adoreant and Debe

List of figures xvi List of tables xx Preface xxii Aims of the Book xxii Audiences for the Book xxiii Structure of the Book xxiii Learning Tools xxiv Using the Book to Teach a Course xxv Help for Old Friends xxvi Acknowledgements xxviii

A Constructive Approach to Measurement

- 1 The BEAR Assessment System: Overview of the "Four Building Blocks" Approach
 - 1.1 What Is "Measurement"? 31.1.1 Construct Modeling 6
 - 1.2 The BEAR Assessment System 7
 - 1.3 The Construct Map 8
 - 1.3.1 Example 1: The MoV Construct in the Data Modeling Assessments 11

Contents X

- The Items Design 15 1.4 1.4.1 Example 1: MoV Items 16 1.4.2 The Relationship between the Construct and the Responses 18 The Outcome Space 19 1.5 1.5.1 Example 1: The MoV Outcome Space 21 The Wright Map 25 1.6 1.6.1 Example 1: The MoV Wright Map 26 1.6.2 Return to the Discussion of Causation and Inference 31 Reporting the Results to the Measurer and Other 1.7
 - Users 32
- Using the Four Building Blocks to Develop an 1.8 Instrument 34
- 1.9 Resources 37
- 1.10 Exercises and Activities 37

PART II **The Four Building Blocks**

- Construct Maps 2
 - The Construct Map 41 2.1
 - 2.2 Examples of Construct Maps 45
 - 2.2.1 Example 1: The Models of Variability (MoV) Construct in the Data Modeling Curriculum 46
 - 2.2.2 Example 2: A Social and Emotional Learning Example (RIS: The Researcher Identity Scale) 47 2.2.3 Example 3: An Attitude Example (GEB: General Ecological Behavior) 48

39

41

Help for Old F

- 2.2.4 Example 4: A 21st Century Skills Example (LPS Argumentation) 51
- 2.2.5 Example 5: The Six Constructs in the Data Modeling Curriculum 53
- 2.2.6 Example 6: A Process Measurement Example— Collaborative Problem-Solving (CPS) 56
- 2.2.7 Example 7: A Health Assessment Example (PF-10: Physical Functioning 10) 58

Contents xi

96

- Example 8: An Interview Example (CUE: 2.2.8 Conceptual Underpinnings of Evolution) 60 Example 9: An Observational Instrument— 2.2.9 Early Childhood (DRDP) 62 2.2.10 Example 10: The Issues Evidence and You (IEY) Science Assessment 64
- Using Construct Mapping to Help Develop an 2.3 Instrument 65
- Examples of Other Construct Structures 67 2.4
- Resources 69 2.5
- Exercises and Activities 69 2.6

- The Items Design 3
 - The Idea of an Item 71 3.1
 - The Facets of the Items Design 74 3.2 3.2.1 The Construct Facet 75 3.2.2 The Secondary Design Facets 78
 - Different Types of Item Responses 81 3.3
 - 3.3.1 Participant Observation 83 3.3.2 Specifying (Just) the Topics 83
 - 3.3.3 Constructed Response Items 84
 - 3.3.4 Selected Response Items 85
 - 3.3.5 Steps in Item Development 88
 - Building-in Fairness through Design 90 3.4 3.4.1 What Do We Mean by Fairness Here? 90 3.4.2 Universal Design 93
 - 3.5 Resources 94
 - Exercises and Activities 94 3.6
- The Outcome Space 4
 - The Qualities of an Outcome Space 96 4.1 4.1.1 Well-defined Categories 98 4.1.2 Research-based Categories 99 4.1.3 Context-specific Categories 100 4.1.4 Finite and Exhaustive Categories 101 4.1.5 Ordered Categories 102 4.2 Scoring the Outcome Space (the Scoring Guide) 103 4.3 General Approaches to Constructing an Outcome Space 104

Contents xiii

215

Resources 190 6.3 Exercises and Activities 191 6.4 Textbox 6.1 The Partial Credit Model 171 Textbox 6.2 Calculating the Thurstonian Thresholds 174

Trustworthiness, Precision, and Reliability 193 7

- Trustworthiness in Measurement 193 7.1
- Measurement Error: Precision 195 7.2
- Summaries of Measurement Error 203 7.3
 - 7.3.1 Internal Consistency Coefficients 204
- 7.3.2 Test-Retest Coefficients 206 7.3.3 Alternate Forms Coefficients 207 7.3.4 Other Reliability Coefficients and Indexes 207 Inter-rater Consistency 209 7.4 Resources 212 7.5 Exercises and Activities 212 7.6
- Trustworthiness, Validity, and Fairness 8
 - Trustworthiness, Continued 215 8.1
 - 8.1.1 Crafting a Full Validity Argument 216
 - Evidence Based on Instrument Content 217 8.2
 - 8.2.1 Instrument Content Evidence for Example 2, the Researcher Identity Scale-G 219
 - 8.3 Evidence Based on Response Processes 222 8.3.1 Response Process Evidence Related to Example 8—The DRDP 223

 - Evidence Based on Internal Structure 224 8.4
 - 8.4.1 Evidence of Internal Structure at the Instrument Level: Dimensionality 225
 - 8.4.2 Dimensionality Evidence for Example 2: The Researcher Identity Scale-G 227
 - 8.4.3 Evidence of Internal Structure at the Instrument Level: The Wright Map 229
 - 8.4.4 Wright Map Evidence from Example 2: The Researcher Identity Scale-G 230
 - 8.4.5 Evidence of Internal Structure at the Item Level 230

xiv Contents

- 8.4.6 Item-level Evidence of Internal Structure for the PF-10 Instrument 232
- 8.5 Evidence Regarding Relations to Other Variables 233
 8.5.1 "Other Variables" Evidence from Two Examples 235
- 8.6 Evidence Based on the Consequences of Using the Instrument 237
- 8.7 Evidence Related to Fairness 238
 - 8.7.1 Differential Item Functioning (DIF) 239 8.7.2 DIF Evidence for the RIS-G 240
- 8.8 Resources 242
- 8.9 Exercises and Activities 242

PART IV A Beginning Rather than a Conclusion

- 9 Building on the Building Blocks
 - 9.1 Choosing the Statistical Model 247
 - 9.1.1 Interpretation of Thurstone's Requirement in Terms of the Construct Map 252
 - 9.2 Comparing Overall Model Fit 257
 - 9.3 Beyond the Lone Construct Map: Multidimensionality 259
 - 9.4 Resources 267
 - 9.5 Exercises and Activities 269 Textbox 9.1 Showing that Equation 9.5 Holds for the Rasch Model 250

Textbox 9.2 Statistical Formulation of the Multidimensional Partial Credit Model 260 **245** 247

1.0

- 10 Beyond the Building Blocks
 - 10.1 Beyond the Construct Map: Learning Progressions 271
 - 10.2 Beyond the Items Design and the Outcome Space: Process Measurement 275
 - 10.3 Beyond the Statistical Model: Considering a More Complex Scientific Model 282
 - 10.4 Other Measurement Frameworks: Principled Assessment Designs 291

271

Contents xv

10.4.1 Example: Evidence-centered Design 292 10.4.2 Going "Outside the Triangle" 294 10.5 A Beginning Rather Than a Conclusion 298 10.5.1 Further Reading about the History of Measurement in the Social Sciences 298 10.5.2 Further Reading about Alternative Approaches 299 10.5.3 Further Reading about the Philosophy of Measurement 300 10.6 Exercises and Activities 301

Appendix A	The Examples Archive	302
Appendix B	Computerized Design, Development,	
	Delivery, Scoring and Reporting-BASS	304
Appendix C	The BEAR Assessment System (BAS): Papers	
	about its Uses and Applications	306
Appendix D	Models of Variation Materials	316
Appendix E	The General Ecological Behavior Items	319
Appendix F	The Item Panel	321
Appendix G	Matching Likert and Guttman Items in the	
	RIS Example	324
Appendix H	Sample Script for a Think-aloud Investigation	328
Appendix I	The Item Pilot Investigation	331
Appendix J	Results from the PF-10 Analyses	333
References		226
Index		252
Innen		555