Contents

1 Introduction 1
- 1.1 The Nature of Research 2
- 1.2 Educational Research 2
- 1.3 What is Research? 3
- 1.4 The Purpose of the Book 4
- 1.5 Educational Decision-Taking 7
- 1.6 Types of Educational Research 8
- 1.7 Two Problem Words: Theory and Hypothesis 10

References 13

2 How Do Students Learn? 15
- 2.1 Hermann Ebbinghaus (1850–1909) 16
- 2.2 Jean Piaget (1896–1980) 16
- 2.3 Lev Semenovich Vygotsky (1896–1934) 19
- 2.4 Some Implications 20
- 2.5 David Ausubel (1918–2008) 22
- 2.6 Jerome Bruner (1915–2016) 25
- 2.7 Robert Gagné (1916–2002) 26
- 2.8 Bringing in All Together 27
- 2.9 Alex H. Johnstone (1930–2017) 28
- 2.10 More About Piaget and Vygotsky 29
- 2.11 More About Ausubel and Bruner 34
- 2.12 More About Robert Gagné 38

References 40

3 A World of Information 43
- 3.1 What is Information Overload? 43
- 3.2 Memory Components 45
- 3.3 From Psychology to Education 47
- 3.4 A Model of Information Flow 49

Reid, Norman
Making sense of learning

digitalisiert durch:
IDS Luzern

3.5 The Perception Filter . . . 51
3.6 The Working Memory . . . 52
3.7 The Long-Term Memory . . . 53
3.8 Learning . . . 54
3.9 Interim Summary . . . 56
3.10 Sensory Memory (Perception Filter) . . . 57
3.11 The Long Term Memory . . . 58
3.12 Summary . . . 60
References . . . 61

4 Why Are Concepts Difficult? . . . 63
4.1 Difficulties . . . 63
4.2 Information Load and Difficulties . . . 65
4.3 The Central Role of Working Memory . . . 69
4.4 More About Working Memory . . . 70
4.5 Reducing the Working Memory Limitations . . . 71
4.6 Working Memory and Test Performance . . . 74
4.7 A Summary . . . 77
4.8 Chunking . . . 78
4.9 Further Aspects of Working Memory . . . 79
4.10 Components of the Working Memory . . . 81
4.11 Special Needs . . . 83
References . . . 84

5 Learner Characteristics . . . 89
5.1 Folk Lore and Evidence . . . 89
5.2 Variations Within a Common Framework . . . 90
5.3 Working Memory Capacity . . . 93
5.4 The Convergency-Divergency Characteristics . . . 94
5.5 Field Dependency . . . 97
5.6 Visual-Spatial Skills . . . 101
5.7 Convergency and Divergency . . . 103
5.8 More About Field Dependency . . . 105
5.9 The Visual-Spatial . . . 106
5.10 Information Processing and Learner Characteristics . . . 107
5.11 Towards a Summary . . . 109
References . . . 111

6 Models of the Curriculum . . . 115
6.1 Why Education? . . . 115
6.2 Developing Education . . . 116
6.3 Developing Subject Curricula . . . 119
6.4 The Learner at the Centre . . . 120
6.5 Curriculum Design . . . 123
6.6 Summary . . . 125

6.7 The Applications-Led Curriculum 127
6.8 The Overall Curriculum Structure 131
6.9 More About Modes of Thinking 133
6.10 More About Bloom's Taxonomy 133
6.11 Emotional Development 135
6.12 Developing Skills 136
6.13 Education and Economics 136
6.14 Curriculum Design 138
6.15 Attitudes and Skills 139
6.16 Assessment 140
6.17 Summary 140
References 141

7 School Subjects and the Curriculum 145
7.1 The Purpose of Education 145
7.2 School Subjects 146
7.3 The Concept of Literacy 157
7.4 Scientific Literacy 159
7.5 Computer Literacy 161
7.6 Summary 162
References 164

8 Assessment Principles 167
8.1 Determining Success for Our Learners 167
8.2 What is Educational Assessment 168
8.3 Assessment, Teaching and Learning 169
8.4 Nature of Assessment 170
8.5 Purposes of Assessment 171
8.6 Some Key Questions 171
8.7 Functions of Assessment 172
8.8 More on What to Assess 175
8.9 Assessment Literacy 177
8.10 Bloom's Taxonomy of Learning Domains 178
8.11 Words of Warning 180
8.12 For Whom Do We Assess 181
8.13 Sources of Error in National Examinations 182
8.14 Assessment Jargon 183
8.15 Validity and Reliability 186
8.16 Criterion-Referenced and Norm-Referenced Assessment 187
8.17 Bringing It Together 190
References 190

9 Assessment Practicalities 193
9.1 Assessment Quality 193
9.2 Methods of Assessment 196

9.3 Objective Assessment Formats 198
9.4 A Summary: Multiple Choice and Partial Knowledge Multiple Choice 200
9.4.1 Advantages 200
9.4.2 Disadvantages 201
9.5 Some Practical Aspects 203
9.6 Structural Communication Grids 204
9.7 A Summary: Structural Communication Grids 207
9.7.1 Advantages 207
9.7.2 Disadvantages 208
9.8 Written Examinations: Question Formats 208
9.9 Assessing Skills 210
9.10 Duly Performed Assessment 211
9.11 Some Conclusions 212
9.12 Gathering Ideas to Generate Quality Questions 213
9.13 From Questions to Examination Papers 214
9.14 Constructing an Examination Paper 216
9.14.1 Step One 216
9.14.2 Step Two 217
9.14.3 Step Three 217
9.14.4 Overall 217
9.15 Analysing the Structure of the Paper 218
9.16 National Examinations 219
9.17 Getting the Marking Right 220
9.18 Examination Specifications 221
9.19 End Piece 223
References 224

10 Thinking Skills 227
10.1 Education for Life? 227
10.2 Types of Thinking 228
10.3 Thinking is Good Thing! 230
10.4 A Way Forward 230
10.5 Scientific Thinking 232
10.6 Systems Thinking 233
10.7 Creative Thinking 234
10.8 Critical Thinking 237
10.9 More About Critical Thinking 242
10.10 Assessing Critical Thinking 244
10.11 Findings from Assessment 246
References 249

11 Beliefs and Attitudes 253
11.1 History of Attitudes 253
11.2 The Concept of Attitudes 256
11.3 Attitudes are Everywhere 258
11.4 Attitudes: Knowledge, Feelings and Behaviour 259
11.5 Attitudes and Behaviour 261
11.6 Measuring Attitudes 263
11.7 From Attitudes Towards Motivation 265
11.8 Bringing It Together 269
11.9 More About Thurstone 269
11.10 More About the Work of Charles Osgood 270
11.11 Examples of the Semantic Differential 271
11.12 Comparing Approaches 273
11.13 Rating Questions 274
11.14 The Situational Set Question 275
11.15 Designing an Attitude Survey 276
11.16 Summary 277
References 277

12 The Development of Attitudes 281
12.1 Measuring Attitudes 281
12.2 Handling Survey Data 282
12.3 Handling Interview Data 285
12.4 Handling the Observation of Behaviour 286
12.5 What Research Studies Have Revealed 287
12.6 What Allows Attitudes to Develop? 289
12.7 Consistency and Inconsistency 290
12.8 Dissonance—The Key 292
12.9 Mental Interaction 293
12.10 The Importance of Attitudes 295
12.11 More About the Nature of Attitudes 298
12.12 More About Measurement Problems 299
12.13 More About Dissonance 302
12.14 More About Practical Ways Forward 305
References 307

13 Practical Teaching 311
13.1 Three Teaching Approaches 311
13.2 Lecturing—Teaching as Telling 312
13.3 Practical Work—Teaching as Doing 315
13.4 Goals for Laboratory Work 315
13.5 A Way Forward 317
13.6 Wider Practical Skills 322
13.7 Group Work—Teaching as Teamwork 322

13.8 Summary ... 326
References ... 327

14 Intelligence, Ability and Performance ... 331
14.1 History of Intelligence ... 331
14.2 Motives ... 334
14.3 The Work of Godfrey Thomson ... 335
14.4 The Evidence ... 336
14.5 High Stakes Testing ... 339
14.6 Some Conclusions ... 342
14.7 More from Alfred Binet ... 343
14.8 More from Robert Sternberg ... 343
14.9 More from Howard Gardner ... 344
14.10 More from Gordon Stobart ... 345
14.11 More About High Stakes Testing ... 346
14.12 Further Problems ... 348
14.13 The GERM Concept ... 352
14.14 The Road to Success? ... 354
References ... 356

15 Developing Quality Education ... 361
15.1 Quality in the Workplace ... 361
15.2 What Is Quality? ... 363
15.3 What Are We Measuring? ... 365
15.4 Why Measure Quality? ... 366
15.5 What Is Good Teaching? ... 367
15.6 Issues of Training ... 370
15.7 Development of Teachers ... 373
15.8 More About Teacher Evaluation ... 374
15.9 Focus on Students ... 378
15.10 Examples of World Approaches to Quality Assurance ... 378
15.11 The World Picture ... 381
15.12 Summary ... 382
References ... 382

16 Making Sense of Statistics ... 385
16.1 Statistical Literacy ... 385
16.2 Popularity and Difficulty ... 386
16.3 Spreadsheets ... 390
16.4 Meaning from Marks ... 392
16.5 The World of Probability ... 393
16.6 Further Uses of Statistics ... 397
16.7 The Way Ahead ... 398
16.8 Teaching Statistics ... 399
16.9 More About Statistical Relationships ... 399

16.10 Statistical Comparisons 401
16.11 More About Statistics 403
16.12 Standardisation of Marks 406
16.13 More About Questionnaires 408
16.14 Summary 409
References 409

17 Myths and Mirages 411
17.1 Educational Myths: A Growing Problem 411
17.2 The Concept of Constructivism 412
17.3 Student Centred Learning 417
17.4 Problem Solving 424
References 428

18 More Myths and Mirages 431
18.1 Learning Styles 432
18.2 New Technologies 436
18.3 Motivation 440
18.4 Use of Questionnaires 447
References 451

19 Educational Futures 455
19.1 Overview 455
19.2 Theme 1: Key Messages About Learning Processes 457
19.3 Towards a Research Agenda 462
19.4 Theme 2: Key Messages About Goals and Assessment 463
19.5 Towards a Research Agenda 468
19.6 Theme 3: Key Messages About Skills and Attitudes 469
19.7 Towards a Research Agenda 472
19.8 Theme 4: Key Messages About Educational Myths 473
19.9 Theme 5: Key Messages About Educational Research 476
19.10 Tomorrow's Research 478
19.11 Endpiece 480
Reference 481

Appendix 483

Index 489