

CONTENTS

Preface v

1 The Role of Research 1

OBJECTIVES 1

- 1.1 What Is Research? 1
- 1.2 Validity in Research 2
- 1.3 Internal and External Validity 3
Evaluating Changes over Time 5 / Comparing Groups 7
- 1.4 Dealing with Reality 8
- 1.5 Survey “Research” 9
- 1.6 Characteristics of the Research Process 10
Research Is Systematic 11 / Research Is Logical 11 /
Research Is Empirical 11 / Research Is Reductive 11 /
Research Is Replicable and Transmittable 12
- 1.7 Steps in the Research Process 12
Identifying a Problem 12 / Constructing a Hypothesis 12 /
Reviewing the Literature 13 / Identifying and Labeling
Variables 13 / Constructing Operational Definitions 13 /
Manipulating and Controlling Variables 13 / Constructing a
Research Design 13 / Identifying and Constructing Devices for
Observation and Measurement 14 / Constructing Questionnaires
and Interview Schedules 14 / Carrying Out Statistical
Analyses 14 / Using the Computer for Data Analysis 14 /
Writing a Research Report 14 / Conducting Classroom
Research 15 / Conducting Evaluation Studies 15
- 1.8 Some Ethical Considerations 15
The Right to Privacy or Nonparticipation 16 / The Right to

Remain Anonymous 16 / The Right to Confidentiality 17 /
The Right to Expect Experimenter Responsibility 17

Recommended Sources 17

Competency Test Exercises 18

2 Selecting a Problem and Constructing Hypotheses 20

OBJECTIVES 20

- 2.1 Characteristics of a Problem 20
Relationship Between Variables 21 / The Problem Is Stated in
Question Form 21 / Empirical Testability 22 / Avoidance
of Moral or Ethical Judgments 22
- 2.2 Narrowing the Range of Problems 22
Schemes for Classifying and Selecting a Problem 22 / Specific
Considerations in Choosing a Problem 24 /
- 2.3 Formulating Hypotheses 25
Observations Versus Specific and General Hypotheses 26 /
Where Do Hypotheses Come From? 27 / Constructing
Alternative Hypotheses 28
- 2.4 Hypotheses Based on Conceptualizing 30
- 2.5 Testing a Hypothesis 33

Recommended Sources 34

Competency Test Exercises 35

3 Reviewing the Literature 37

OBJECTIVES 37

- 3.1 Purpose of the Review 37
Discovering Important Variables 38 / Distinguishing What Has
Been Done from What Needs to Be Done 38 / Synthesizing and
Gaining Perspective 39 / Determining Meanings and
Relationships 39
- 3.2 Literature Review Sources 41
ERIC 41 / Abstracts 43 / Indexes 45 / Reviews 46 /
Journals and Books 47
- 3.3 Conducting a Literature Search 48
Choosing Interest Areas and Descriptors 48 / Searching for

Relevant Titles and Abstracts	51	/	Locating Important Primary Source Documents	52
3.4	Reviewing and Abstracting	53		
3.5	In Conclusion	56		
	<i>Recommended Sources</i>	56		
	<i>Competency Test Exercises</i>	57		

4 Identifying and Labeling Variables 58

OBJECTIVES 58

4.1	A Hypothesis and Its Variables	58									
4.2	The Independent Variable	58									
4.3	The Dependent Variable	59									
4.4	The Relationship Between Independent and Dependent Variables	59									
	Some Examples of Independent and Dependent Variables	60									
4.5	The Moderator Variable	63									
	Some Examples of Moderator Variables	64									
4.6	Control Variables	65									
	Some Examples of Control Variables	66									
4.7	Intervening Variables	67									
4.8	The Combined Variables	69									
	Example 1	69	/	Example 2	69	/	Example 3	71	/	Example 4	71
4.9	Some Considerations for Variable Choice	72									
	<i>Recommended Sources</i>	74									
	<i>Competency Test Exercises</i>	75									

5 Constructing Operational Definitions of Variables 77

OBJECTIVES 77

5.1	Why Have Operational Definitions?	77		
5.2	An Operational Definition Is Based on Observable Criteria	79		

5.3 Alternative Ways of Generating Operational Definitions 80
Type A Operational Definitions 80 / Type B Operational
Definitions 81 / Type C Operational Definitions 82

5.4 The Criterion of Uniqueness 84

5.5 Examples from the Sample Studies 85

5.6 Operational Definitions and the Research Process 86
Testability 87 / Predictions 88

5.7 The Research Spectrum 89

Recommended Sources 91

Competency Test Exercises 92

6 *Identifying Techniques for the Manipulation and Control of Variables* 94

OBJECTIVES 94

6.1 The Control Group 94

6.2 Factors Affecting Internal Validity 96
History 96 / Selection 97 / Maturation 97 / Testing 98
/ Instrumentation 98 / Statistical Regression 99 /
Experimental Mortality 99 / Stability 100 / Interactive
Combinations of Factors 100 / Expectancy 100

6.3 Factors Affecting External Validity 101
Reactive Effects of Testing 101 / Interaction Effects of Selection
Bias 102 / Reactive Effects of Experimental Arrangements
102 / Multiple Treatment Interference 103

6.4 Controlling for Selection: Equating Experimental and Control
Groups 103
Randomization 104 / Matched-Pair Technique 105 /
Matched-Group Technique 106 / Using Subjects as Their Own
Controls 106 / Limiting the Population 107 / The Moderator
Variable as a Selection Device 107

6.5 Controlling for History: Equating Experimental and Control
Conditions 107
Method of Removal 108 / Method of Constancy 108 /
Method of Counterbalancing 109 / Method of Multiple
Counterbalancing 110

- 6.6 Overall Control of Selection and History 111
- 6.7 Controlling for Instrumentation 111
- 6.8 An Analysis of Control in Three Studies 113
 - Sample Study I (Appendix A) 113 / Sample Study II (Appendix A) 114 / The Lockmiller-DiNello Study 116
- 6.9 Appraising the Success of the Manipulation 120
- Recommended Sources* 124
- Competency Test Exercises* 125

7 Constructing Research Designs 127

OBJECTIVES 127

- 7.1 A Shorthand for Displaying Designs 127
- 7.2 Pre-Experimental Designs (Nondesigns) 128
 - One-Shot Case Study 128 / One-Group Pretest-Posttest Design 129 / Intact-Group Comparison 129
- 7.3 True Experimental Designs 130
 - Posttest-Only Control Group Design 130 / Pretest-Posttest Control Group Design 131
- 7.4 Factorial Designs 133
- 7.5 Quasi-Experimental Designs 136
 - Time-Series Design 137 / Equivalent Time-Samples Design 139 / Nonequivalent Control Group Design 141 / Separate-Sample Pretest-Posttest Design 144 / "Patched-Up" Design 146
- 7.6 Ex Post Facto Designs 147
 - Co-Relational Study 148 / Criterion-Group Design 149
- 7.7 Designs to Control for External Validity Based on Reactive Effects 152
 - Designs to Control for Hawthorne Effect 152 / Designs Providing for Expectancy Controls 154

Recommended Sources 156

Competency Test Exercises 157

8 Identifying and Describing Procedures for Observation and Measurement 160

OBJECTIVES 160

- 8.1 Test Reliability 160
 - Test-Retest Reliability 161 / Alternate-Forms Reliability 162 / Split-Half Reliability 162 / Kuder-Richardson Reliability 163
- 8.2 Test Validity 163
 - Predictive Validity 163 / Concurrent Validity 164 / Construct Validity 164 / Content Validity (or Test Appropriateness) 165
- 8.3 Types of Measurement Scales 166
 - Nominal Scales 166 / Ordinal Scales 166 / Interval Scales 167 / Ratio Scales 167 / Scale Conversion 168
- 8.4 Describing Test Performances 168
 - Percentiles 168 / Standard Scores 169 / Norms 170
- 8.5 Standardized or Norm-Referenced Tests 172
 - Achievement, Aptitude, and Intelligence Tests and Batteries 173 / Character, Personality, Sensory-Motor, and Vocations Tests 174
- 8.6 Criterion-Referenced Tests 175
- 8.7 Constructing a Paper-and-Pencil Performance Test 176
- 8.8 Constructing a Scale 178
 - Likert Scale 179 / Semantic Differential 181
- 8.9 Constructing an Observation Recording Device 184
 - Rating Scales 184 / Coding Systems 188

Recommended Sources 192

Competency Test Exercises 193

9 Constructing and Using Questionnaires and Interview Schedules 196

OBJECTIVES 196

- 9.1 What Do Questionnaires and Interviews Measure? 196
- 9.2 How May the Questions Be Asked? 197
 - Direct Versus Indirect Questions 198 / Specific Versus Nonspecific Questions 198 / Fact Versus Opinion 198 /

- Questions Versus Statements 199 / Predetermined Versus Response-Keyed Questions 199
- 9.3 How May the Questions Be Answered? 200
Unstructured Response 200 / Fill-in Response 201 / Tabular Response 201 / Scaled Response 202 / Ranking Response 204 / Checklist Response 208 /Categorical Response 209
- 9.4 Constructing a Questionnaire or Interview Schedule 210
Specifying the Variables to Be Measured 210 / Choosing the Question Format 210 / Choosing the Response Mode 212 / Preparing Interview Items 214 / Preparing Questionnaire Items 216 / Pilot Testing and Evaluating a Questionnaire 225
- 9.5 Sampling Procedures 226
Random Sampling 226 / Defining the Population 227 / Establishing Specifications for Stratified Random Sampling 228 / Determining Sample Size 231
- 9.6 Procedures for Administering a Questionnaire 232
Initial Mailing 233 / Follow-Ups 234 / Sampling Nonrespondents 237
- 9.7 Conducting an Interview Study 237
Selecting and Training Interviewers 237 / Conducting an Interview 238
- 9.8 Coding and Scoring 239
Objectively Scored Items 239 / Fill-In and Free-Response Items 241

Recommended Sources 245

Competency Test Exercises 246

10 Carrying Out Statistical Analyses 249

OBJECTIVES 249

- 10.1 Significance Testing 249
- 10.2 Measures of Central Tendency and Variability 250
Mean 250 / Median 251 / Standard Deviation 251
- 10.3 Parametric and Nonparametric Statistical Tests 252
- 10.4 Choosing the Appropriate Statistical Test 254
- 10.5 Carrying Out Parametric Statistical Tests 257

The *t*-Test 257 / Parametric Correlation (Pearson Product-Moment Correlation) 259 / Analysis of Variance 262

- 10.6 Carrying Out Nonparametric Statistical Tests 269
Mann-Whitney *U*-Test 269 / Spearman Rank-Order Correlation 271 / Chi-Square (χ^2) Test 273

Recommended Sources 278

Competency Test Exercises 280

11 Using Procedures for Data Processing 282

OBJECTIVES 282

11.1 Data Coding 282

11.2 Data Rostering 285

11.3 The Punch Card and Data Rostering 290

11.4 The Use of Computer Programs for Data Analysis 292
Program Selection 292 / Preparing Control Cards: An Example 295 / Another Example—"Teaching Style Study: Part Two" 298

11.5 Computer Output: The Printout 301
Illustration 1. The "Teaching Style Study"—Correlational and Chi-Square Analysis 301 / Illustration 2. The "Teaching Style Study: Part Two"—Analysis of Variance 304

Recommended Sources 306

Competency Test Exercises 307

12 Writing a Research Report 309

OBJECTIVES 309

12.1 The Research Proposal 309

12.2 The Introduction Section 310
Context of the Problem 310 / Statement of the Problem 311 / Review of the Literature 313 / Statement of the Hypotheses 315 / Rationale for the Hypotheses 315 / Operational Definitions of the Variables 317 / Operational Restatement of the Hypotheses 318 / Significance of the Study 319

- 12.3 The Method Section 320
Subjects 320 / Tasks 321 / Independent Variables 323 /
Dependent Variables 324 / Procedures 326 / Data
Analysis 327
- 12.4 The Results Section 328
- 12.5 The Discussion Section 330
To Conclude or Summarize 331 / To Interpret 332 / To
Integrate 334 / To Theorize 335 / To Recommend or
Apply 336 / To Suggest Extensions 337
- 12.6 The References 338
- 12.7 The Abstract 340
- 12.8 Preparing Tables 340
- 12.9 Preparing Figures and Graphs 345
- Recommended Sources* 348
- Competency Test Exercises* 349

13 Doing Classroom Research 351

OBJECTIVES 351

- 13.1 Problems and Hypotheses 351
- 13.2 Independent Variables 352
Instructional Program 353 / Instructional Materials 354 /
Teaching Style or Strategy 354 / Learning Environment 355
/ Learning Activity 355
- 13.3 Moderator Variables 356
Student Characteristics 356 / Teacher Characteristics 357 /
Learning Materials Characteristics (Content or Structure) 357
- 13.4 Dependent Variables 358
Specific Knowledge and Comprehension 358 / General
Knowledge and Comprehension 359 / Thinking and Problem
Solving 359 / Attitudes and Values 361 / Learning-Related
Behavior 363
- 13.5 Procedures and Designs 363
Sampling 363 / Reliability 367 / Design 367 /
Statistics 368

13.6 Illustrative Studies 369

Recommended Sources 373

Competency Test Exercises 374

14 Conducting Evaluation Studies 377

OBJECTIVES 377

14.1 Formative Versus Summative Evaluation 377

14.2 A Model for Summative Evaluation 378

14.3 Defining the Goals of a Program 379
Identifying the Aims of the Intervention: The Dependent Variable 379 / Operationally Defining the Dependent Variable: Behavioral Objectification 380

14.4 Measuring the Goals of a Program (the Dependent Variable) 383

14.5 Assessing Attainment of a Program's Goals 385
Identifying a Comparison Group: The Independent Variable 385 / Data Collection and Analysis 389

14.6 Illustrations of Summative Evaluation Studies 389
Evaluating a Job Training Program 389 / Evaluating a Reading Program 391

Recommended Sources 393

Competency Test Exercises 394

References Cited in the Text 395

Appendix A: Sample Studies and a Sample Proposal 401

Appendix B: Tables 439

Answers to Exercises 453

Index of Names and Titles 469

Index of Subjects 473