Contents

| PREFACE ACKNOWLEDGMENTS | | XI |
|----------------------------|---|----|
| | | xi |
| 1 | Introduction | 1 |
| | Concepts and the Cognitive Structure | 3 |
| | Mental Operations in Concept Learning | 16 |
| | Concept Utilization | 21 |
| | Words for Concepts and Their Defining Attributes | 24 |
| | Plan of This Book | 26 |
| | For Further Study | 27 |
| 2 | Methods of Studying Cognitive Development | 29 |
| | Methods of Studying Cognitive Learning and Development | 30 |
| | Objectives of the Present Study and Development of Concept Assessment Batteries | 38 |
| | Design and Methods of the Present Combined Longitudinal-Cross-sectional Study | 44 |
| | Results Pertaining to Comparisons between Control Groups and Longitudinal Blocks | 50 |
| | For Further Study | 58 |

| 3 | Mental Operations and Levels of Concept Attainment | 59 |
|---|---|-----|
| | Attending and Discriminating | 60 |
| | Generalizing | 70 |
| | Inductive Operations at the Formal Level | 73 |
| | Operations Involving Meaningful Reception Learning | |
| | at the Formal Level | 78 |
| | For Further Study | 82 |
| 4 | Memory and Levels of Concept Attainment | 83 |
| | The Memory System | 83 |
| | Memory and Concept Attainment Levels | 91 |
| | Conditions of Learning and Memory Requirements | 99 |
| | For Further Study | 105 |
| 5 | Language and Concept Attainment | 107 |
| | The Linguistic-Relativity Hypothesis | 107 |
| | Culture, Concepts, and Language | 109 |
| | Words, Word Meanings, and Concepts | 111 |
| | Facilitative Effects of Language and Concept Attainment | 123 |
| | Developmental Trends in Acquiring Concept Definitions | |
| | and Names of Concepts and Defining Attributes | 130 |
| | For Further Study | 133 |
| 6 | The Invariant Sequence in Attaining Four Successive Levels of Concepts: | |
| | Longitudinal—Cross-sectional Results | 135 |
| | Invariant Sequencing | 135 |
| | Cross-sectional Results | 138 |
| | Longitudinal and Combined | |
| | Longitudinal—Cross-sectional Results | 144 |
| | Discussion | 156 |
| | For Further Study | 159 |

| 7 | Rate and Form of Cognitive Development across the School Years: | |
|---|---|--|
| | Longitudinal-Cross-sectional Results | 161 |
| | Developmental Norms Related to Attaining | |
| | the Levels of Each Concept | 164 |
| | Developmental Norms Related to Understanding Principles, Understanding Taxonomic Relations, and Problem Solving | 167 |
| | Development Related to Attaining the Classificatory and Formal Levels Combined and | |
| | the Three Uses of the Concepts Combined | 173 |
| | Difference among Concepts in Terms of the Age | |
| | at Which Students Attain the Classificatory Level | 175 |
| | Relationship between Mastery of Each Concept Level | |
| | and Mastery of the Related Principles, | |
| | Taxonomic Relations, and Problem Solving | 177 |
| | Discussion | 181 |
| | For Further Study | 184 |
| 8 | Interindividual and Intraindividual Differences in Cognitive Development: | |
| | | 105 |
| | Longitudinal—Cross-sectional Results | 185 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of | 185 |
| | Interindividual Differences in Full Attainment | 185 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining | 186 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses | 186 189 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development | 186 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development Conditions Contributing to Rapid and Slow Cognitive | 186 189 192 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development Conditions Contributing to Rapid and Slow Cognitive Development | 186 189 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development Conditions Contributing to Rapid and Slow Cognitive | 186 189 192 198 |
| | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development Conditions Contributing to Rapid and Slow Cognitive Development Discussion | 186 189 192 198 204 |
| 9 | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development Conditions Contributing to Rapid and Slow Cognitive Development Discussion | 186 189 192 198 204 |
| 9 | Interindividual Differences in Full Attainment of the Concept Levels and in Mastery of the Uses within and across Grades Intraindividual Differences in Patterns of Attaining the Concept Levels and Uses Differences in Individuals' Rates of Cognitive Development Conditions Contributing to Rapid and Slow Cognitive Development Discussion For Further Study | 186 189 192 198 204 205 |

| | Performing an Instructional Analysis | 221 |
|------|--|-----|
| | Illustrative Lessons | 228 |
| | For Further Study | 238 |
| 10 | Nurturing Cognitive Development through Instructional Programming for | 220 |
| | the Individual Student | 239 |
| | Changing the School to Nurture Individual Student Development | 240 |
| | Adapting Instruction to Nurture Individual Student Development | 247 |
| | Mastery Learning and Individual Student Development | 254 |
| | Teaching Process Concepts of Science: A Longitudinal Intervention Study | 257 |
| | For Further Study | 265 |
| | . or varare, stady | 200 |
| 11 | Conclusion | 267 |
| | | |
| | Invariant Sequence | 269 |
| | Normative Development of Levels | 270 |
| | Normative Development Related to Understanding Principles, Understanding Taxonomic Relations, and Problem Solving | 271 |
| | Differences among Concepts in Age of Attainment | 272 |
| | Mastery of Concept Levels and Mastery of Uses | 272 |
| | Interindividual and Intraindividual Differences | 273 |
| | Rapid and Slow Cognitive Development | 274 |
| | Nurturing Cognitive Development through Formal Education | 276 |
| | Cognitive Operations, Memory, and Language | 278 |
| | Cognitive Operations, Memory, and Language | 270 |
| | Appendix | 285 |
| | References | 301 |
| | | = - |
| ALIT | HOR INDEX | 315 |
| | UBJECT INDEX | |
| | | |