# Instructor's Manual

*for*

# A Research Primer for Communication Sciences and Disorders

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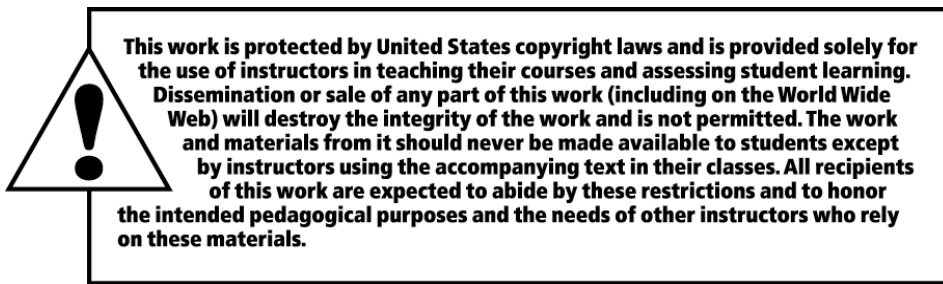
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PREFACE

The *Instructor's Manual* for *A Primer for Research in Communication Sciences and Disorders* provides overviews, objectives, key terms, and a bank of test questions for each chapter. The material in the *Instructor's Manual* supplements the Thought Questions, Case Studies, and Student Exercises that accompany each chapter of the book. Instructors are encouraged to incorporate thought questions, case studies, and chapter exercises throughout the course as active learning and formative assessment strategies.

Formative and Summative Assessments

*Formative instruction* occurs when teachers inform students in ways that improve their learning or when students engage in self reflection. Formative instruction works best when it occurs regularly throughout the course. Formative tests are usually not graded but are used as ongoing diagnostic tools. The instructor and students employ the results to modify and adjust teaching/learning practices. In contrast, *summative assessments* are tests such as those given at midterm or at the end of the course for the sole purpose of evaluation. Other examples of summative assessments are the standardized achievement tests such as the ACT, SAT, GRE, and the Praxis Exam. Black and Wiliam (1998) offered a culinary analogy to explain the difference between formative and summative assessments. When a cook tastes the soup, that is formative assessment. When the customer tastes the soup, that is summative assessment. Examples of formative learning and assessment techniques include: (a) focused listening, (b) opinion polls, (c) 2-minute papers, and (d) the muddiest point.

*Focused listening* measures what students do and do not know about the topic. It can be used at the beginning, middle, or end of a class period. When to use focused listening depends on the instructor's objective. If the instructor wishes to assess students' prior knowledge of a topic, focused listening is implemented at the beginning of a class period or prior to introducing a new topic. The use of focused listening in the middle of a lecture provides feedback that the instructor can use during the instruction. The use of focused listening at the end of a class measures: (a) students' comprehension of the material and (b) the effectiveness of the instructor's teaching methods. Focused listening is implemented by introducing a focal concept and providing instructions to students. For example, students can be instructed to write down as many words as possible in a minute that are related to a focal concept or a key term. The results may be reviewed in class for immediate feedback or collected and reviewed outside of class.

> Write down as many words as you can that are related to "scientific method."

Another formative learning/assessment strategy makes use of opinion polls. *Opinion polls* help to determine what students think about a specific topic including their misconceptions, attitudes, biases, and values. A quick poll can help instructors decide how best to present a topic. Alternatively, an opinion poll at the end of class can help assess whether students' attitudes have changed as a result of the instruction. A simple classroom poll would ask students to raise their

hands in response to a question.  An alternative and more formal procedure is to cast ballots.  These are synchronous instruction procedures.  If the course is asynchronous (web based), the instructor can use discussion groups or ask for ballots to be cast online.

> Do you believe that clinical practice should be based on scientific evidence?

> Summarize the most important points from today's lecture.

A third formative learning/assessment strategy is the 2-minute paper.  The *two-minute paper* is most appropriate at the end a class period.  The instructor may ask students to summarize the day's lecture, state questions that remain, or list the most important things that they learned during the class period.  To implement the two-minute paper, instructors typically reserve several minutes at the end of the class period.  The instructor collects the students' responses and evaluates them outside of class.  The results can be used to help plan the next days' lecture.  If teaching is asynchronous, the students can submit 2-minute papers at the end of each week or at the conclusion of each assignment.

A fourth formative learning/assessment strategy is the muddiest point.  The *muddiest point* technique is best used at the end of a class period.  The students are asked to write down one thing about the day's lecture that they did not understand.  The instructor collects the students' responses and uses the responses to help plan the next day's lecture or review.  In asynchronous learning situations, students can offer muddiest points in discussion groups online.

> What is one thing about today's material that you did not understand?

Writing Assignments

Students benefit most from hands-on experience with research.  Collaborative research projects encourage students to appreciate the excitement of discovery and the reward of scholarship (Mueller & Lisko, 2003).  In the course of hands-on experience with research, students should be encouraged to practice their writing skills.  Writing is a creative process, but instruction and practice help to teach style and the mechanics of writing.  In addition to student-directed research, writing assignments might take the form of critical reviews of research reports.  The rewriting/revision and editing stages of the writing process are opportunities for formative assessment and instruction.  The material in Chapter 13 is a resource for developing writing

skills.  Though the chapter is placed at the end of the textbook, instructors may find it useful to assign readings in Chapter 13 prior to writing assignments for the course.

## Distance Learning

Reid (2009) says that "Online courses are a disruptive technology in the sense that it requires different pedagogical methods which may not yet be fully understood."  According to Reid (2009), key features for the successful implementation of online courses include the student's familiarity with information technology in advance of the course as well as training for the online moderators (instructors).  Whereas feedback in synchronous, classroom environments is almost immediate, the feedback in asynchronous learning environments is often delayed for days.  Teachers of online courses can overcome this disability by incorporating feedback mechanisms at regular intervals that students can anticipate.

It may also be difficult to encourage discussion of key points among students who are disconnected by geographic distance and asynchronous time.  This problem is overcome by incorporating a "water cooler" area in the online course for discussion and social interaction. The advantages of online instruction include the diversity of experiences and geographic dispersion of students.  Students should be encouraged to share their different orientations and experiences as they relate to the research topic.  For example, what are research questions that relate to your personal experiences and locale?

As Graham et al. (2000) point out, asynchronous conferencing is a key component of online instruction.  To use asynchronous conferencing effectively, they recommend:

1. Make the grade dependent on the student's participation.
2. The instructor should provide a specific task to help focus the discussion rather than just asking students to discuss a topic.  Sometimes it is helpful to assign roles (e.g. sides of an issue) to stimulate discussion.
3. The task is chosen to engage the student in the content.
4. Discussion should be evaluated based on quality of content and not length or number of postings.
5. Instructors should post examples of expectations for discussions, e.g. types of postings that are substantive.
6. Students should get feedback on discussions.
7. Discussion groups should be small enough to encourage meaningful discussion.  If your online course includes a large number of students, you can assign students to different discussion groups.

References

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CHAPTER ONE

SCIENTIFIC INQUIRY IN COMMUNICATION DISORDERS RESEARCH

OVERVIEW

Chapter One outlines the principles of scientific inquiry and presents the fundamental ideas that are the foundation for research in communication sciences and disorders. As such, the chapter is wide ranging in its presentation including a variety of topics from the rules that govern the scientific process to the extraneous variables that often affect conclusion validity. Given the importance of the topics presented in Chapter One, they should be mastered before progressing to the discussion of research designs found in Chapters Four, Five, Six, and Seven. Some topics in Chapter One are readily understood, while other concepts are more challenging and will benefit from additional attention in classroom lectures. For example, students may not easily comprehend issues related to validity, threats to validity, and control measures as they apply to communication disorders research.

The critical concepts presented in Chapter One include the taxonomy of research in communication disorders, steps in the scientific method, cause and effect, types of variables encountered in research, validity, need for operational definitions, and the importance of reliability in the research protocol. Chapter One addresses critical concepts and concludes with examples of journals which publish original research in communication sciences and disorders. Sample case studies and exercises are included at the end of Chapter One as learning exercises to rehearse the important concepts in practical contexts. The instructor may assign any or all of these exercises to students for completion, or the instructor might develop additional scenarios based on concepts introduced in Chapter One. Instructors are encouraged to utilize one or more of the formative instructional techniques described in the Preface to assess students' mastery of the material in Chapter One before introducing new topics.

OBJECTIVES

Four objectives address the primary focus of Chapter One. On completion of Chapter One, students should:

1)      Appreciate the scientific principles underlying research in communication disorders;

2)      Distinguish between applied and basic research types and other classification schemes that define research design and methodology;

3)      Appreciate the many factors that affect the quality of research in communication disorders;

4)      Know common threats to internal validity and external validity, recognize which research designs are more or less vulnerable, and know the controls available to counter unwanted variables.

## OUTLINE

I. The Need for Scientific Inquiry

II.      The Scientific Method
  A.    Order
  B.    Determinism
  C.    Discoverability
  D.    Cause and effect
  E.    Steps in the scientific method
        1.    Statement of the problem
        2.    The research hypothesis
        3.    The research method
        4.    The analysis of results
        5.    Interpretation of results

III.      Types of Research in Communication Disorders
  A.    Basic and applied research
  B.    Laboratory and field studies
  C.    Experimental and quasi-experimental research types

IV.      Types of Variables in Communication Disorders Research
  A.    Independent and dependent variables
  B.    Active and attribute variables
  C.    Continuous and categorical variables
  D.    Extraneous variables

V.      Operational Definitions in Communication Disorders Research
  A.    Two types of operational definitions
  B.    The limits of operational definitions

VI.      Data Collection in Communication Disorders Research
  A.    The reliability of collected data
  B.    Blinding procedures
  C.    Inter-observer reliability

VII.     Internal Validity in Communication Disorders Research
  A.    Ambiguous temporal precedence effects
  B.    Controlling ATP effects
  C.    Differential selection effects
  D.    Controlling selection effects
  E.    History effects
  F.    Controlling history effects
  G.    Maturation effects
  H.    Controlling maturation effects
  I.    Statistical regression effects
  J.    Controlling statistical regression effects
  K.    Attrition effects
  L.    Controlling attrition effects
  M.    Testing effects
  N.    Controlling testing effects
  O.    Instrumentation effects
  P.    Controlling instrumentation effects
  Q.    Additive and interaction effects

# TEST BANK

1.   Scientists believe the occurrence of an event is determined by prior events is important to the scientific method. This notion is known as:
   a.   Discoverability
   b.   Order
   c.   Duality
   d.   Determinism

2.   The expression of reality without the intrusion of personal beliefs.
   a.   Duality
   b.   Determinism
   c.   Objectivity
   d.   Reliability

3.   The scientific method imposes all the following conditions on observations except:
   a.   Observations must be repeatable
   b.   Observations must be quantifiable
   c.   Observations must be objectivity
   d.   Observations must be public

4.   The requirement that scientific observations are repeatable is necessary for:
   a.   Confirming results
   b.   Insuring the openness of results
   c.   Expressing reality without bias or emotion
   d.   Speculating about unobserved results

5.   Human perceptions sometimes match expectations rather than actual observations. This notion is known as:
   a.   Objectivity
   b.   Determinism
   c.   Duality
   d.   Causality

6.   An example of a statement that infers causality:
     a.   Most speech-language pathologists prefer evidence-based practice.
     b.   Specific-language-impaired and typically-developing children have different conversational skills.
     c.   Fifty-percent of audiologists dispense hearing aids.
     d.   Dysphagia is sometimes a symptom of stroke.

7.   Not a condition for inferring causality.
     a.   No other variable accounts for the observed change.
     b.   The causal factor occurs immediately before the change.
     c.   The change is observable.
     d.   The causal factor occurs before the change.

8.   Of the three conditions for inferring causality, this condition is the most problematic.
     a.   No other variable can account for the change.
     b.   The treatment occurs before the observed change.
     c.   The change is observable.
     d.   The change occurs immediately following the treatment.

9.   The step in the scientific method that specifies participants and details a plan for observation.
     a.   Statement of the problem
     b.   Interpretation of results
     c.   Analysis of results
     d.   Description of the research method

10.  Which of the following statements describes basic research?
     a.   Solves a social or clinical problem.
     b.   Modifies an existing theory.
     c.   Provides direct evidence for evidence-based practice.
     d.   Explores differences between normal and disordered populations.

11.  Research that is conducted in everyday settings such as homes, schools, and clinics.
     a.   Field research
     b.   Laboratory research
     c.   Experimental research
     d.   Quasi-experimental research

12.  In this type of research, the independent variable cannot be controlled or manipulated.
     a.   Experimental research
     b.   Laboratory research
     c.   Quasi-experimental research
     d.   Field research

13.  Chronological age is an example of what types of variables?
     a.   Active and attribute variables
     b.   Active and categorical variables
     c.   Continuous and active variables
     d.   Continuous and attribute variables

14.  Which of the following is an operational definition for dysphagia?
     a.   Occasional choking after swallowing
     b.   Chronic swallowing problems
     c.   Drooling
     d.   Pocketing food

15.  A variable other than the dependent and independent variables.
     a.   Active variable
     b.   Categorical variable
     c.   Extraneous variable
     d.   Attribute variable

16.  A possible control utilized when instrument effects may be problematic.
     a.   Perceptual anchors
     b.   Counterbalancing
     c.   Minimize the length of experimentation
     d.   No controls are available

17.  All of the following are possible "experimenter effects" except:
     a.   Gender and age
     b.   Nonverbal behavior
     c.   Personal bias
     d.   Statistical regression

18.  Outside events that may influence the dependent variable during the course of a study.
     a.   Experimenter effects
     b.   Selection effects
     c.   History effects
     d.   Testing effects

19.  A threat to an experiment's external validity.
     a.   Instrumentation effects
     b.   Novelty and disruption effects
     c.   Attrition effects
     d.   Ambiguous temporal precedence

20.  A research design that is not vulnerable to "ambiguous temporal precedence effects."
     a.   Correlation designs
     b.   Semi-longitudinal designs
     c.   Longitudinal designs
     d.   Pretest-posttest designs

## ESSAY QUESTIONS

1.    Describe how each assumption (order, determinism, discoverability) is important to the scientific method?

2.    What are the three conditions necessary to infer causality?

3.    Describe each step of the scientific process and its goal(s).

4.    What are two types of applied research, and how do they differ?

5.    What is the importance of random assignment to the research process?

6.    How do quasi-experimental research designs differ from experimental research designs?

7.      What are the differences between independent and dependent variables?  Provide two examples of each?

8.      Explain the importance of operational definitions to the research process?

9.      What procedures are necessary for insuring the reliability of collected data?

10.     In what ways are internal validity and external validity important to researchers?

## ANSWER KEY

1.      d
2.      c
3.      b
4.      a
5.      c
6.      d
7.      b
8.      a
9.      d
10.     b
11.     a
12.     c
13.     d
14.     b
15.     c
16.     a
17.     d
18.     c
19.     b
20.     d