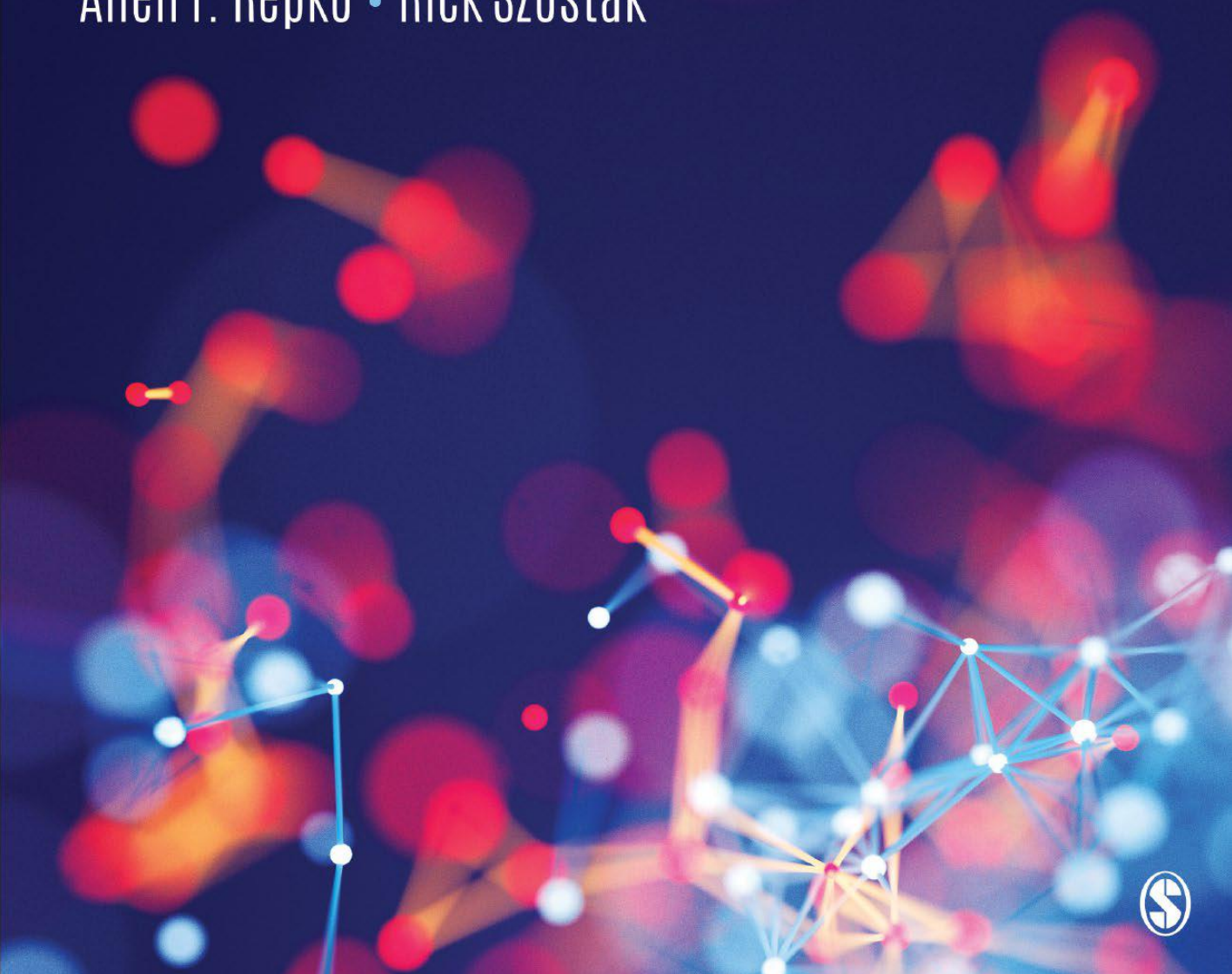
INTERDISCIPLINARY Research

Process and Theory

4 EDITION

Allen F. Repko • Rick Szostak



Interdisciplinary Research

Fourth Edition

To our spouses, children, and grandchildren—
"The greatest force in the world is an idea whose time has come."

Sara Miller McCune founded SAGE Publishing in 1965 to support the dissemination of usable knowledge and educate a global community. SAGE publishes more than 1000 journals and over 600 new books each year, spanning a wide range of subject areas. Our growing selection of library products includes archives, data, case studies and video. SAGE remains majority owned by our founder and after her lifetime will become owned by a charitable trust that secures the company's continued independence.

Los Angeles | London | New Delhi | Singapore | Washington DC | Melbourne

Interdisciplinary Research

Process and Theory

Fourth Edition

Allen F. Repko
The University of Texas at Arlington (Retired)

Rick Szostak
University of Alberta, Canada

SAGE

Los Angeles | London | New Delhi
Singapore | Washington DC | Melbourne

FOR INFORMATION:

SAGE Publications, Inc.
2455 Teller Road
Thousand Oaks, California 91320
E-mail: order@sagepub.com

SAGE Publications Ltd.
1 Oliver's Yard
55 City Road
London EC1Y 1SP
United Kingdom

SAGE Publications India Pvt. Ltd.
B 1/I 1 Mohan Cooperative Industrial Area
Mathura Road, New Delhi 110 044
India

SAGE Publications Asia-Pacific Pte. Ltd.
18 Cross Street #10-10/11/12
China Square Central
Singapore 048423

Printed in the United States of America

Library of Congress Cataloging-in-Publication Data

Names: Repko, Allen F., author. | Szostak, Rick, 1959- author.

Title: Interdisciplinary research : process and theory / Allen F. Repko, University of Texas at Arlington (Retired), Rick Szostak, University of Alberta, Canada.

Description: Fourth edition. | Los Angeles : SAGE, [2021] | Includes bibliographical references and index.

Identifiers: LCCN 2019037613 | ISBN 9781544398600 (paperback) | ISBN 9781544398594 (epub) | ISBN 9781544398587 (epub) | ISBN 9781544398570 (pdf)

Subjects: LCSH: Interdisciplinary research.

Classification: LCC Q180.55.I48 R47 2021 | DDC 001.4—dc23
LC record available at https://lccn.loc.gov/2019037613

This book is printed on acid-free paper.

Acquisitions Editor: Helen Salmon
Editorial Assistant: Megan O'Heffernan
Production Editor: Bennie Clark Allen
Copy Editor: Lana Arndt
Typesetter: C&M Digitals (P) Ltd.
Proofreader: Molly Hall
Indexer: Alison Syring
Cover Designer: Candice Harman
Marketing Manager: Shari Countryman

20 21 22 23 24 10 9 8 7 6 5 4 3 2 1

BRIEF CONTENTS

DETAILED CONTENTS

PREFACE

THE BOOK

The purpose of the fourth edition of *Interdisciplinary Research: Process and Theory* is to reflect the substantial research on all aspects of interdisciplinarity that has been published since the appearance of the third edition in 2017. The literature on interdisciplinary research continues to expand; we have drawn in this revision upon many works from Europe and Australia, as well as North America. This book also reflects feedback from faculty and students who have used the third edition. Our goal in this edition is to provide a comprehensive and systematic presentation of the interdisciplinary research process and the theory that informs it, not only for students, but also for professionals and interdisciplinary teams. The book emphasizes the relationships among theory, research, and practice in an orderly framework so that the reader can more easily understand the nature of the interdisciplinary research process.

NEW IN THE FOURTH EDITION

The fourth edition incorporates the following revisions:

- We have added a list of guiding questions to the start of each chapter.
- We have expanded our discussion of creativity within the interdisciplinary research process, especially in Chapters 3, 4, 12, and 13.
- We have added more detail on the strategies associated with several STEPS.
- We have incorporated insights from dozens of recent publications.
- We have extended our discussion in the Preface on the importance of students performing independent research while reading this book.
- We have expanded and revised our discussion of epistemology in Chapters 1 and 2.
- We address confirmation bias and social media in Chapter 1.
- We discuss how interdisciplinary causal linkages may destabilize disciplinary systems of stability in Chapters 2 and 4.

- We give extended advice on how to choose a research question in Chapter 3.
- We note in Chapter 4 that many of the strategies outlined in this book have applicability beyond the academy.
- We give specific advice to graduate students on literature search in Chapter 5.
- We emphasize in Chapters 6 and 7 that disciplinary adequacy involves both evaluating insights in terms of their disciplinary perspective and pursuing debates in the discipline regarding the research question.
- We stress that interdisciplinary researchers bring new questions to the evaluation of disciplinary theories and methods in Chapter 7.
- We address the philosophy of integration in Chapter 8. We also added an example of the technique of organization.
- We discuss the role of scholarly disagreements in Chapter 9.
- We added discussions of student work patterns, mapping, finding common ground in different situations, and ethical conflicts in Chapter 10.
- We provide some clarification of the nature of both philosophical theory and models, and clarify how to address situations where disciplinary insights are complementary in Chapter 11.
- We clarify the different types of integration in Chapter 12.
- We add discussions of job interviews, policy side-effects, metacognition, understanding scholarship as a conversation, and the importance of persuasion in Chapter 13.
- We also deleted material in several chapters that was tangential to our main purpose.

The new edition continues using features that students and instructors have said they find helpful. These include the easy-to-follow step-by-step approach to describe the research process, tables and figures to illustrate aspects of each STEP, and a variety of examples oriented toward students working in the natural sciences, the social sciences, and the humanities. The additions and changes reflect the concerns and developments that have surfaced in the field since the publication of the third edition. From the constructive criticism offered by instructors and students, we have refined the prose to make it more readable, made key concepts and processes more accessible to students, and reduced the use of in-text quotations except where it is preferable to read the author's own words. Sources are cited in the text to demonstrate best scholarly practice.

THE NEED FOR THIS BOOK

This book is needed for four reasons. First, interdisciplinarity is an emerging paradigm of knowledge formation whose spreading influence can no longer be denied, discounted, or ignored. The reason is explicit: "Interdisciplinarity is associated with bold advances in knowledge, solutions to urgent societal problems, an edge in technological innovation, and a more integrative educational experience" (Klein, 2010, p. 2).

Second, this book is a corrective to those who argue that interdisciplinarity is too hard to do, who reject the notion that the field should aspire to its own methodology, or who worry that if the field becomes "disciplined it cannot offer the peculiar kind of insights that our times require" (Frodeman, Klein, Mitcham, & Holbrook, 2010, p. xxxi). It is also a corrective to those who argue that interdisciplinarity is easy in the sense that it can be done without reflection. Moreover, it helps to correct several mistaken understandings of interdisciplinarity, such as that interdisciplinarity is hostile to disciplines (see Szostak, 2019).

Third, those involved in interdisciplinary education have requested this book. As noted by Carol Geary Schneider (2010), president of the Association of American Colleges and Universities, "Interdisciplinarity is now prevalent throughout American colleges and universities" (p. xvi). Faculty are concerned that students learn how to do interdisciplinary research and writing. This is one of the important findings reported in the 2003 volume of *Issues in Integrative Studies* titled "Future Directions for Interdisciplinary Effectiveness in Higher Education: A Delphi Study." The study posed this question to its participants, all of whom are leading interdisciplinary practitioners: "What changes in interdisciplinary studies programs need to take place over the next decade in order to better serve the needs of students whose academic goals are not adequately addressed by traditional discipline-based programs?" Under "Curriculum," the participants recommended a textbook that provides an overview of disciplinary perspectives, theories, and methodologies, and especially integrative techniques, along with concrete examples (Welch, 2003, p. 185). Further evidence that the topic is neglected comes from Klein (2005a), who in *Humanities, Culture, and Interdisciplinarity: The Changing American Academy* criticizes the tendency of scholars to "hover at the level of theory with little or no attention to what is happening on the ground of practice" (p. 7). This book is a response to these concerns. It attempts to apply theory to the "ground of practice" and make the interdisciplinary research process comprehensible and achievable for students.

Fourth, the book enables students to differentiate between interdisciplinary research and disciplinary research. An important contribution of the book is that it surveys the dozen or so research methodologies used by the disciplines and explains how these are

foundational to, but different from, the interdisciplinary research process. The book also reflects an emerging consensus about the meanings and operations of important interdisciplinary theories and concepts.

THE INTENDED AUDIENCE

The book is aimed at four audiences: undergraduate students, graduate students, faculty, and members of interdisciplinary research teams. Through its extensive discussion of the disciplines and their defining elements, the book provides students not only with understanding of the interdisciplinary research process, but also with useful discipline-specific information. This information on disciplinary perspectives, phenomena, epistemologies, assumptions, theories, and methods is as necessary for multidisciplinary research as it is for interdisciplinary research. Students in disciplinary majors may also find this information helpful to tie together courses they may take in different disciplines. Graduate students and faculty will appreciate the book's glossary of key terms, endnotes, extensive sources, various teaching aids, numerous examples that demonstrate best practices from professional work, and recommended readings organized by specialty from the field's extensive literature in the Appendix.

Most books on research methods can assume professional consensus about the principles of the field they present. Because the field of interdisciplinary studies has only just reached the point where there is sufficient potential for scholarly consensus on the principles of the field, this book has to point the reader toward a scholarly rationale in the literature for each principle, in addition to explaining the principle itself. In a sense, then, the book is aimed at faculty teaching an interdisciplinary course as much as at students taking that course. Undergraduate and graduate students can learn about interdisciplinary studies from the rationale for each interdisciplinary principle, as well as from the principles themselves.

The book is intended as either a core text or a supplemental resource for undergraduate and graduate courses that are interdisciplinary. More specifically, the book is useful in a variety of academic contexts: intermediate-level courses that focus on interdisciplinary research and theory; upper-level topics, problems, or theme-based courses that involve working in two or more disciplines; integrative capstone and senior seminar courses that require an in-depth interdisciplinary research paper/project; keystone courses that integrate general education for upper-level undergraduate programs; graduate courses in interdisciplinary teaching and/or research; teaching assistant training/certificate courses in interdisciplinary learning, thinking, and research; first-semester master's-level research courses; and administrators and faculty who wish to develop interdisciplinary courses and programs at their institutions. The book, particularly its early chapters, may serve

as a primary text for introductory interdisciplinary studies courses. For a text designed especially for those courses, see Repko, Szostak, and Buchberger (2020), *Introduction to Interdisciplinary Studies,* third edition. This book is also useful to multidisciplinary programs calling on students to cross several disciplinary domains, professionals, and interdisciplinary teams practicing interdisciplinary research.

THE APPROACH USED AND STYLE OF PRESENTATION

This book's approach to interdisciplinary research is distinctive in at least six respects. (1) It describes how to *actually do* interdisciplinary research using processes and techniques of demonstrated utility whether one is working in the natural sciences, the social sciences, the humanities, or applied fields. (2) It integrates and applies the body of theory that informs the field into the discussion of the interdisciplinary research process. (3) It presents an easy-to-follow, but not formulaic, decision-making process that makes integration and the goal of producing a more comprehensive understanding achievable. The term *process* is used rather than *method* because, definitionally, *process* allows for greater flexibility and reflexivity, particularly when working in the humanities, and it distinguishes interdisciplinary research from disciplinary methods. (4) The book highlights the foundational and complementary role of the disciplines in interdisciplinary work, the necessity of drawing on and integrating disciplinary insights, including insights derived from one's own basic research. (5) The book includes numerous examples of interdisciplinary work from the natural sciences, the social sciences, and the humanities to illustrate how integration is achieved and how an interdisciplinary understanding is constructed, reflected on, tested, and communicated. (6) This book is ideally suited for active learning and problem-based pedagogical approaches, as well as for team teaching and other more traditional strategies.

DESIGN FEATURES

The book aids student content comprehension by using current learning strategies that characterize the modern textbook. The book's self-contained yet interconnected chapters promote flexibility in structuring courses, depending on the individual instructor's needs and interests. Conceptual and organizational approaches include chapter objectives and learning outcomes, section headings and subheadings, boldfacing of key concepts, italicizing of key statements, graphics to illustrate key concepts, tables to present content in a concise and coherent way, notes to readers, chapter summaries, a glossary of key concepts with chapter and page references, an author index, and a detailed subject index. Faculty

can profitably use chapter components that correspond to their own approach to interdisciplinary research while omitting others.

HOW TO USE THIS BOOK

Students will best master the material in this book by applying it to their own research. Only then can students fully appreciate the value of the advice and information provided in this book. One strategy of proven utility is for students to work (solo or in small groups) on a semester-long project in three or four segments that correspond to various STEPS in the interdisciplinary research process (IRP). For example, the first segment might include the first two STEPS. Providing feedback on each segment of the project in a timely manner will aid students to make improvements in their work before they proceed to the next segment.

Both authors have in our own courses required students to perform research projects of their own choice. We have then discussed how students address each STEP in class. We have found that students enjoy aiding each other, and come to appreciate the value of the STEPS and strategies for performing these when they see these usefully applied to a student research project (especially their own!). We recognize, though, that some instructors and students may wish to deviate from this approach. They may prefer some sort of video or live presentation of results along with or instead of the traditional research paper. They may prefer team research: This may be especially valuable, for it forces students to appreciate the perspectives of other team members. They may pursue community service learning, where the student volunteers with some community organization during the term. At the end of the term, they write a reflective essay on their experience and the advice that they have for the organization. They should explore how techniques of interdisciplinary analysis can be applied to the work of the organization. Some instructors may wish to ask students to produce an ePortfolio or intellectual autobiography in which students are guided to reflect on various questions—about themselves and about the course—as the course proceeds. Students can then observe how their understanding of interdisciplinarity, and their ability to perform interdisciplinarity analysis, has been enhanced by this course (see Repko, Szostak, & Buchberger [2020] for advice on community service learning, ePortfolios, and intellectual biographies).

End-of-chapter exercises can be used in two ways: to stimulate class discussion and to facilitate deep learning of critical components of the IRP. Students should be encouraged to discuss both the challenges and successes they experience in performing each STEP with their group and/or with the class as a whole. Importantly, instructors should candidly share their experience with interdisciplinary research and explain how they

overcame certain challenges. Students who struggle with a particular STEP, and then learn that a certain strategy allows them to move forward, will long remember the strategy.

Instructors new to interdisciplinary studies should be aware that some STEPS take longer for students to understand and perform than others. For example, they often stumble at STEP 1: identifying a research topic. The criteria for selecting a topic or problem suitable for interdisciplinary inquiry and justifying using an interdisciplinary approach is not explained until Chapter 3. Nevertheless, instructors are well advised at the outset of the term to ask students to reflect on the sorts of problems or topics they care about and that could be researched using information from more than one discipline.

For best results, instructors should encourage students to *do research while learning* about the various STEPS. They should urge students to start looking for relevant literature early on even though they have not yet mastered the intricacies of conducting the full-scale literature search discussed in Chapter 5 (STEP 4). Instructors who do this report that students are often more appreciative of learning the various literature search techniques after they have tried searching on their own.

Some STEPS are more time intensive than others. Such is the case for the critical STEPS of creating common ground (STEP 8) and producing a more comprehensive understanding of the problem (STEP 9) near the end of the IRP. Instructors should make certain that students have ample time to understand this material and complete these critical STEPS before the research project is due.

By carefully pacing coverage of the information presented in this book, instructors will enable students to produce a high-quality product and develop a deep appreciation for interdisciplinary studies.

CONTENTS

The book is divided into three sections, each organized around a theme that addresses a central issue of the field of interdisciplinary studies. Part I, consisting of two chapters, defines interdisciplinary studies, explains the intellectual essence of the field, and introduces the disciplines and their perspectives. Part II, consisting of five chapters, introduces the model of the IRP and explains how to draw on disciplinary insights and theories. Part III, consisting of six chapters, explains how to integrate conflicting disciplinary insights by creating common ground between them, construct a more comprehensive understanding of the problem, test it, and communicate it to an appropriate audience.

Part I: About Interdisciplinary Studies and Disciplines

Today, interdisciplinary learning at all academic levels is far more common, and there is greater understanding of what it is. Early definitions of interdisciplinary studies were quite general and disparate, but the range of meanings has narrowed dramatically over the last decade and these are integrated into the definition presented in this book. Interdisciplinary learning is more widespread because educators recognize that it is needed, that the disciplines though necessary are insufficient by themselves to address the complex problems that are demanding attention in today's world.

Chapter 1: Introducing Interdisciplinary Studies. Chapter 1 answers the question: *What is interdisciplinary studies?* The popularity of the term *interdisciplinarity* in the academy, the multiplication of interdisciplinary initiatives and programs, and the persistence of exaggerated claims and outdated suppositions about interdisciplinarity heighten the importance of achieving clarity about its meaning that is grounded in authoritative sources. The chapter defines interdisciplinary studies, describes the intellectual essence of interdisciplinarity, and distinguishes interdisciplinarity from disciplinarity, multidisciplinarity, transdisciplinarity, and integrative studies.

Chapter 2: Introducing the Disciplines and Their Perspectives. Interdisciplinary studies is based on the generally held assumption that the disciplines are foundational to interdisciplinarity. If so, then students should know how knowledge is typically structured in the modern academy and how it is reflected in its organization. They should also know how the disciplines usually associated with each major category—the natural sciences, the social sciences, the humanities, and the applied fields—engage in learning and produce new knowledge. There are unresolved questions and significant differences of opinion, however, over precisely what interdisciplinarians should use from the disciplines and how they should use it. The chapter attempts to bridge these differences by defining the term *disciplinary perspective* to mean those defining elements of a discipline—the phenomena, epistemology, assumptions, concepts, theories, and methods—that constitute its intellectual "center of gravity" and differentiate it from other disciplines. The chapter unpacks the meaning of these elements and explains how they are used in the interdisciplinary research process. The chapter also presents two approaches to ascertain the relevance of a particular discipline's perspective on the problem: the "perspectival approach," which calls for linking the problem to those disciplines whose perspectives embrace it, and the "classification approach," which calls for connecting the problem (at least initially) directly to the phenomena typically studied by disciplines. By focusing on phenomena, researchers can broaden their investigation without focusing prematurely on particular disciplines. Subsequent chapters draw heavily from the information provided in this chapter.

Part II: Drawing on Disciplinary Insights

Three more questions follow in the focus on interdisciplinary studies: *What is the interdisciplinary research process? How is it achieved? What theory or body of theory informs it?* Part II introduces the IRP and describes how to select a problem or research question and justify using an interdisciplinary approach (Chapter 3), discusses how to identify disciplines relevant to the problem or research question (Chapter 4), explains how to conduct the literature search (Chapter 5), examines how to develop adequacy in relevant disciplines (Chapter 6), and demonstrates how to analyze the problem and evaluate insights (Chapter 7).

Chapter 3: Beginning the Research Process. Chapter 3 presents an integrated and step-based research model of the IRP. The chapter asserts that the process the model delineates is not linear, but a series of carefully considered decision points called "STEPS," which can lead to integration and a more comprehensive understanding of the problem. The process is heuristic and involves a good deal of reflexivity. This chapter begins the process of identifying decision points and research pathways and provides examples of them from published and student work. STEP 1 discusses how to develop a good research question and stresses the importance of framing the research or focus question in a way that is appropriate to interdisciplinary inquiry. STEP 2 urges students to justify using an interdisciplinary approach. The chapter addresses the need for greater transparency in interdisciplinary writing that will make these decision points and research pathways explicit.

Chapter 4: Identifying Relevant Disciplines. STEP 3 asks researchers to identify disciplines relevant to the problem, topic, or question. This chapter focuses on two decision points. The first is to decide which disciplines (including subdisciplines, interdisciplines, and schools of thought) are *potentially* interested in the problem. This decision should be made before conducting the full-scale literature search. Researchers are urged to map the problem to reveal its constituent disciplinary parts and connect each part to the discipline which studies that part. The second decision point is to reduce the number of "potentially relevant" disciplines to those that are "most relevant."

Chapter 5: Conducting the Literature Search. After defining *literature search* in the context of interdisciplinary studies, the chapter presents reasons for conducting a full-scale systematic literature search (STEP 4) and notes the special challenges confronting interdisciplinarians. The search process is divided into two phases: the initial search conducted at the outset of the project and the full-scale search conducted later. The chapter describes the organization and classification of books in research libraries and presents various search strategies, noting mistakes commonly made when beginning the literature search. The chapter then discusses how to conduct the full-scale search.

Chapter 6: Developing Adequacy in Relevant Disciplines. This chapter introduces how to develop adequacy in relevant disciplines, focusing on *how much* knowledge is required from each discipline and *what kind* of knowledge. Interdisciplinary researchers need to appreciate both disciplinary perspective and disciplinary debates regarding the issue being researched. The chapter discusses developing adequacy in disciplinary *theories*, explains the reason to understand theories and their concepts, and demonstrates how to proceed in identifying relevant theories. The chapter also discusses developing adequacy in disciplinary *methods*. Adequacy requires familiarity with the dozen or so methods used in the natural sciences, the social sciences, and the humanities, and their strengths and limitations. And adequacy involves understanding the interdisciplinary position on methods, how a discipline's preferred methods correlate to its preferred theories, and the importance of providing in-text evidence of disciplinary adequacy.

Chapter 7: Analyzing the Problem and Evaluating Insights. The chapter explains how to analyze the problem from each disciplinary perspective and evaluate its insights. This involves identifying the strengths and limitations of each author's perspective and theory, recognizing that each author's approach to the problem may be skewed and understanding the implications of this, recognizing that the data or evidence upon which the insight and theory are based may also be skewed, and recognizing that the methods used by authors may be skewed as well. Interdisciplinarians evaluate disciplinary theories and methods in a way that is different from, but complementary to, disciplinary evaluation. Analyzing the problem also necessitates reflecting on how one's personal or disciplinary bias may skew one's understanding of the problem, thus compromising the integrity of the interdisciplinary research process.

Part III: Integrating Insights

Engaging in the interdisciplinary research process raises further questions: How does one perform the integrative task? What, precisely, is being integrated? What is the understanding that is produced? How should it be tested? Integration, as presented here, is a process that involves making a series of decisions (Chapter 8). These involve identifying conflicts among insights and their sources (Chapter 9), creating common ground among concepts and/or assumptions (Chapter 10), creating common ground among theories (Chapter 11), constructing a more comprehensive understanding (Chapter 12), and reflecting on, testing, and communicating the understanding (Chapter 13).

Chapter 8: Understanding Integration. Integration is the key distinguishing characteristic of interdisciplinary work. After noting the controversy between generalists and integrationists over integration, the chapter establishes that integration should be the goal of interdisciplinary work, even though undergraduates and those working in the humanities may achieve only partial integration. The chapter identifies conditions necessary to

perform integration, discusses the philosophy of integration, and describes the model of integration used in this book. The chapter discusses *what* the model of the IRP integrates, *how* it integrates, and what the *results* of integration look like. It answers three fundamental questions concerning integration.

Chapter 9: Identifying Conflicts Among Insights and Their Sources. This chapter focuses on the integrative part of the IRP, beginning with identifying conflicts among insights and their sources (STEP 7). These conflicts stand in the way of creating common ground and, thus, of achieving integration. Conflicts among insights are generally discovered when conducting the full-scale literature search. Possible sources of conflict among insights are their embedded concepts, theories, and the assumptions underlying them. The chapter concludes by discussing the importance of communicating one's research to the appropriate audience(s).

Chapter 10: Creating Common Ground Among Insights: Concepts and/or Assumptions. This chapter begins STEP 8 and is guided by the idea that disciplinary insights are potentially complementary if their concepts and theories and the assumptions underlying their concepts and theories are sufficiently modified. The theories of common ground and cognitive interdisciplinarity are the basis for collaborative communication and integration. The chapter defines common ground and presents six core ideas that form the basis for creating it. It explains how to create common ground among conflicting concepts or assumptions, identifies four techniques used to modify concepts and assumptions, and explains how to create common ground when ethical positions conflict.

Chapter 11: Creating Common Ground Among Insights: Theories. This chapter continues STEP 8, defining disciplinary theory. It describes the models, variables, concepts, and causal relationships that one typically encounters when working with disciplinary theories. Researchers working with a set of theories will have to create common ground by modifying them directly through their concepts or indirectly via their underlying assumptions. The chapter discusses the modification strategies commonly used.

Chapter 12: Constructing a More Comprehensive Understanding or Theory. After defining "a more comprehensive understanding or theory," the chapter explains how to construct the understanding from concepts and/or assumptions that were modified and from which common ground was created. STEP 9 lays out two pathways. The first pathway is applicable to the humanities, the fine and performing arts, and some applied fields where the focus of integration is directly on concepts and indirectly on their underlying assumptions. In these contexts, achieving full interdisciplinarity involves consciously choosing to construct an understanding that is comprehensive and nuanced.

The second pathway is applicable to the natural and social sciences, sometimes to the humanities, and to some applied and multidisciplinary fields where the focus of knowledge formation is on the development of theories to explain the phenomena of interest. The chapter identifies and illustrates five strategies demonstrated to achieve integration and construction of a more comprehensive theory.

Chapter 13: Reflecting on, Testing, and Communicating the Understanding or Theory. The final task of the IRP is STEP 10 to reflect on, test, and communicate the more comprehensive understanding or theory. The chapter discusses the four sorts of reflection that are called for in interdisciplinary work, including what has actually been learned from the project, what STEPS (of the IRP) were omitted, what were one's own biases, and what are the strengths and limitations of the insights and theories used, including the utility of the IRP itself. Students are invited to reflect on how they might describe their interdisciplinary education in a job interview. The chapter explains how to test the quality of one's work in a way that takes into account the literature on cognition and instruction, and then identifies four approaches to test the more comprehensive understanding.

Finally, the chapter stresses the importance of communicating the understanding *persuasively* in multiple ways to multiple audiences regardless of academic level. The activity of communicating the results of integrative work is, in fact, another way of testing its coherence, unity, and balance, and thus whether it constitutes partial or full interdisciplinarity.

The field of interdisciplinary studies is beginning to demonstrate its full potential and generate the volume and scope of new knowledge that its founders envisioned. The process of knowledge formation can be accelerated and find a wider audience as its practitioners produce more and better interdisciplinary work. To this end, we offer this fourth edition with its undoubted limitations to facilitate interdisciplinary education and research.

Editable, chapter-specific PowerPoint® slides and tables and figures pulled from the book are available on the instructor site at **study.sagepub.com/repko4e**.

Professor Allen F. Repko
Former Director
Interdisciplinary Studies Program
The University of Texas at Arlington

Professor Rick Szostak
Professor and Chair, Department of Economics
University of Alberta, Edmonton, Canada

ACKNOWLEDGMENTS

SAGE Publishing gratefully acknowledges input from the following reviewers:

Carol Barrett, Union Institute & University, and Saybrook University

Robert S. Garner, Salisbury University

Charles R. Hamilton, Texas A&M University, Central Texas

Kristin Picardo, St. John Fisher College

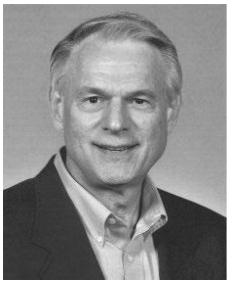
Dianna Rust, Middle Tennessee State University

Anissa J. Sorokin, Stevenson University

Marcus Tanner, Texas Tech University

Sabrina Wengier, Middle Georgia State University

ABOUT THE AUTHORS



Allen F. Repko, PhD, is the former director of the interdisciplinary studies program in the School of Urban and Public Affairs at the University of Texas at Arlington, where he developed and taught the program's core courses for many years. Repko has written extensively on all aspects of interdisciplinary studies, has twice served as coeditor of the interdisciplinary journal *Issues in Integrative Studies*, and has served on the board of the Association for Interdisciplinary Studies (AIS). Though "retired," he continues to work on newer editions of his books.

Rick Szostak, PhD, is a professor of economics at the University of Alberta, where he has taught for 31 years. He is the author of a dozen books and 50 articles, all of an interdisciplinary nature. Several of his publications address how to do interdisciplinary research, teach interdisciplinary courses, administer interdisciplinary programs, or organize information to facilitate interdisciplinarity. As an associate dean, he created the Office of Interdisciplinary Studies at the University of Alberta, the Science, Technology and Society program, an individualized major, and two courses about interdisciplinarity. He has twice served as coeditor of the interdisciplinary journal *Issues in Integrative Studies.* He was president of the Association for Interdisciplinary Studies (AIS) from 2011 to 2014. He can be contacted at rszostak@ualberta.ca.

PART I

ABOUT INTERDISCIPLINARY STUDIES AND DISCIPLINES

Image by Mohamed Hassan from Pixabay.

1

INTRODUCING INTERDISCIPLINARY STUDIES

LEARNING OUTCOMES

By the end of this chapter, you will be able to

- Define interdisciplinary studies
- Describe the intellectual essence of interdisciplinarity
- Distinguish interdisciplinarity from multidisciplinarity, transdisciplinarity, and integrative studies

GUIDING QUESTIONS

What is interdisciplinary studies?

What are the key characteristics of interdisciplinary studies?

How can we define interdisciplinarity, and carefully distinguish this from multidisciplinarity, transdisciplinarity, and integrative studies?

CHAPTER OBJECTIVES

In any university, whether physical or virtual, you will definitely encounter the disciplines. They are powerful and pervasive approaches to learning and knowledge production. They shape our perceptions of the world, our ability to address complexity, our understanding of others and ourselves—and usually the administrative structure of colleges and universities. Less than 200 years old in their modern form, the disciplines have come to dominate the ordering, production, and communication of knowledge. Today, however, disciplinary dominance is being challenged by interdisciplinarity.

This chapter introduces interdisciplinary studies as an academic field. We define interdisciplinary studies and present the intellectual essence of the field in terms of its assumptions, theories, and epistemology. We then distinguish interdisciplinarity from multidisciplinarity, transdisciplinarity, and integrative studies.

DEFINING INTERDISCIPLINARY STUDIES

Interdisciplinary studies refers to a diverse and growing academic field with its own literature, curricula, community of scholars, undergraduate majors, and graduate programs. Importantly, it uses a research process designed to produce new knowledge in the form of more comprehensive understandings of complex problems. The focus of this book is on this research process.

Before defining interdisciplinary studies, we unpack the meaning of its three parts: *inter, disciplinary,* and *studies.*

The "Inter" Part of Interdisciplinary Studies

The prefix *inter-* means "between, among, in the midst," or "derived from two or more." **Disciplinary** means "of or relating to a particular field of study" or specialization. Thus, a starting point for understanding the meaning of *interdisciplinary studies* is between two or more fields of study.

This "between" space is contested space—problems, issues, or questions that are the focus of several disciplines. For example, urban riots are an interdisciplinary problem because they are an economic problem *and* a racial problem *and* a public policy problem. The important point is that the *disciplines are not the focus of the interdisciplinarian's attention; the focus is the problem or issue or intellectual question that each discipline is addressing.* The disciplines are simply a means to that end.

The "Disciplinary" Part of Interdisciplinary Studies

Inside the academy, *discipline* refers to a particular branch of learning or body of knowledge such as physics, psychology, or history (Moran, 2010, p. 2). **Disciplines** are scholarly communities that specify which phenomena to study, advance certain central concepts and organizing theories, embrace certain methods of investigation, provide forums for sharing research and insights, and offer career paths for scholars. It is through their power over careers that disciplines are able to maintain these strong preferences: Disciplinary scholars generally gain a PhD within the discipline, get hired by a disciplinary department, and are granted tenure, promotions, and salary increases depending in large part on how that department judges their research and teaching. An **insight** is a scholarly contribution to the understanding of a problem based on research.

Each discipline has its own defining elements—phenomena, assumptions, philosophical outlook (i.e., epistemology), concepts, theories, and methods—that distinguish it from other disciplines (the subject of Chapter 2). For example, disciplines choose methods that are good at investigating their theories. All of these characteristics are interrelated and are included within a discipline's overall disciplinary perspective on reality.

History is an example of a discipline because it meets all of the above criteria. Its knowledge domain consists of an enormous body of *facts* (everything that has been recorded in human history). It studies an equally enormous number of *concepts or ideas* (colonialism, racism, freedom, and democracy). It generates *theories* about why things turned out the way they did (e.g., the great man theory argues that the American Civil War lasted so long and was so bloody because President Abraham Lincoln decided to issue the Emancipation Proclamation in 1862), although many historians strive to be atheoretical. Furthermore, it uses a research *method* that involves close reading and critical evaluation of primary sources (e.g., letters, diaries, official documents) and secondary sources (e.g., books and articles) to present a coherent picture of past events or persons within a particular time and place. **Close reading** is a method that calls for careful analysis of a text and close attention to individual words, syntax, potential biases, and the order in which sentences and ideas unfold.

Categories of Traditional Disciplines

There are three broad categories of traditional disciplines[1] (see Table 2.1 in Chapter 2):

- The natural sciences tell us what the world is made of, describe how what it is made of is structured into a complex network of interdependent systems, and explain the behavior of a given localized system.
- The social sciences seek to explain the human world and figure out how to predict and improve it.
- The humanities express human aspirations, interpret and evaluate human achievements and experience, and seek layers of meaning and richness of detail in written texts, artefacts, and cultural practices.

The Fine and Performing Arts

In addition to the traditional disciplines is the category of the fine and performing arts. These include art, dance, music, and theater. They rightly claim disciplinary status because their defining elements are very different from those of the humanities disciplines.

The Applied and Professional Fields

The **applied fields** also occupy a prominent place in the modern academy. These include business (and its many subfields such as finance, marketing, and management), communications (and its various subfields including advertising, speech, and journalism), criminal justice and criminology, education, engineering, law, medicine, nursing, and social work. (*Note:* Many of these applied and professional fields and schools claim disciplinary status.)

The Emergence of Interdisciplines

The line between the disciplines and interdisciplinarity has begun to blur in recent years with the emergence of **interdisciplines**. These are fields of study that cross traditional disciplinary boundaries and whose subject matter is taught by informal groups of scholars or by well-established research and teaching faculties. *Interdisciplines may or may not be interdisciplinary.* Frequently cited examples of interdisciplines are neuroscience, biochemistry, environmental science, ethnomusicology, cultural studies, women's studies, urban studies, American studies, and public health (National Academies, 2005, pp. 249–252). Some interdisciplines use a wide range of theories, methods, and phenomena, while others behave much like disciplines by focusing on a narrow set of these (see Fuchsman, 2012).

NOTE TO READER

The disciplines, applied fields, and interdisciplines are not rigid and unchanging but are evolving social and intellectual constructs. That is, they take on new theories, methods, and research questions over time, while shedding other theories, methods, or questions. They nevertheless retain their control over the careers of disciplinary scholars.

The "Studies" Part of Interdisciplinary Studies

The first fields to describe themselves using the word "**studies**" were those focused on particular sociocultural groups (including women, Hispanics, and African Americans). The word then became common in a host of contexts in the natural sciences and social sciences. In fact, "studies" programs are proliferating in the modern academy. In some cases, even the traditional disciplines (particularly in the humanities) are renaming themselves as studies, such as English studies and literary studies (Garber, 2001, pp. 77–79).

Why "Studies" Is an Integral Part of Interdisciplinary Studies

Studies programs in general represent fundamental challenges to the existing structure of knowledge. These new arrangements share with interdisciplinary studies (as described in this book) a broad dissatisfaction with traditional knowledge structures (i.e., the disciplines) and a recognition that the kinds of complex problems facing humanity demand that new ways be found to order knowledge and bridge different approaches to its creation and communication. Today, there are programs that include a core of explicitly interdisciplinary courses, established interdisciplinary fields such as area studies

(e.g., Middle Eastern studies) and materials science, and highly integrated fields such as environmental studies, urban studies, sustainability studies, and cultural studies.

Comparing the Disciplines and Interdisciplinary Studies

The seven main characteristics of the established disciplines are compared and contrasted with those of interdisciplinary studies in Table 1.1. There are three differences (#1, #2, and #3) and four similarities (#4, #5, #6, and #7). The differences explain why the use of "studies" in interdisciplinary studies is appropriate:

- Interdisciplinary studies does not lay claim to a universally recognized core of knowledge as, say, physics does, but rather draws on existing disciplinary knowledge, while always transcending it via integration (#1).
- Interdisciplinary studies has a research process of its own (the subject of this book) to produce knowledge but freely borrows methods from the disciplines when appropriate (#2).
- Interdisciplinary studies, like the disciplines, seeks to produce new knowledge, but unlike them, it seeks to accomplish this via the process of integration (#3).

TABLE 1.1 ⬢ Comparison of Established Disciplines to Interdisciplinary Studies

Established Disciplines	Interdisciplinary Studies
Claim a body of knowledge about certain subjects or objects	Claims a burgeoning professional literature of increasing sophistication, depth of analysis, breadth of coverage, and thus, utility. This literature includes subspecialties on interdisciplinary theory, program administration, curriculum design, research process, pedagogy, and assessment. Most important, a growing body of explicitly interdisciplinary research on real-world problems is emerging.
Have methods of acquiring knowledge and theories to order that knowledge	Makes use of disciplinary methods, but these are subsumed under an interdisciplinary research process that involves drawing on relevant disciplinary insights, concepts, theories, and methods to produce integrated knowledge
Seek to produce new knowledge, concepts, and theories within or related to their domains	Produces (via integration) new knowledge, more comprehensive understandings, new meanings, and cognitive advancements (We will define "more comprehensive understanding" and "cognitive advancement" in later chapters.)
Possess a recognized core of courses	Is beginning to form a core of explicitly interdisciplinary courses
Have their own community of experts	Is forming its own community of experts

(Continued)

TABLE 1.1 ⬢ (Continued)

Established Disciplines	Interdisciplinary Studies
Are self-contained and seek to control their respective domains as they relate to each other	Draws on the disciplines for material but also on an interdisciplinary literature
Train future experts in their discipline-specific master's and doctoral programs	Is training future experts in older fields such as American studies and in newer fields such as cultural studies through its master's and doctoral programs and undergraduate majors. Though new and explicitly interdisciplinary PhD programs are emerging, interdisciplinary studies still typically hires those with disciplinary PhDs.

Source: Adapted from Vickers, J. (1998). Unframed in open, unmapped fields: Teaching the practice of interdisciplinarity. *Arachne: An Interdisciplinary Journal of the Humanities*, *4*(2), 11–42.

Why "Studies" Is Plural

"Studies" is plural because of the idea of interaction between disciplines (Klein, 1996, p. 10). Imagine the world of knowledge wherein each discipline is like a box containing thousands of dots, each dot representing a bit of knowledge discovered by an expert in that discipline. Then imagine similar boxes representing other disciplines, each filled with dots of knowledge. Scholars interested in "studies" are excited by the prospect of examining a broad issue or complex question that requires looking inside as many disciplinary boxes as necessary to identify those dots of knowledge that have some bearing on the issue or question under investigation. "Studies" scholars, including those in interdisciplinary studies, are in the business of identifying and connecting dots of knowledge regardless of the disciplinary box in which they reside (Long, 2002, p. 14). Interdisciplinarians are interested not in merely rearranging these ever-changing dots of knowledge but in *integrating* them into a new and more comprehensive understanding that adds to knowledge.

Studies programs recognize that many research problems cannot easily be addressed from the confines of individual disciplines because they require the participation of many experts, each viewing the problem from its distinctive disciplinary perspective.

Critics of studies programs charge that they lack disciplinary "substance and good scholarship" (Salter & Hearn, 1996, p. 3). **Scholarship** is a contribution to knowledge that is "*public,* susceptible to *critical review and evaluation,* and accessible for *exchange and use* by other members of one's scholarly community" (Shulman, 1998, p. 5). "Substance" and "scholarship" are typically code words for disciplinary depth-intensive focus on a discipline or **subdiscipline**. By emphasizing a narrow set of theories, methods, and phenomena, disciplines are able to carefully police whether their theories and methods are correctly applied to appropriate phenomena.

A contrasting view is that a purely disciplinary focus sacrifices breadth, comprehensiveness, and realism for depth. An integrated view, which this book reflects, recognizes that there is a symbiosis between disciplinary and interdisciplinary research. By articulating the nature of the interdisciplinary research process, we can encourage comparable rigor in interdisciplinary analysis, while utilizing any relevant disciplinary theories and methods.

This is not to say that a "studies" program is superior to a disciplinary one. That would be a mistake because the purpose of each is different. *Both are needed*, particularly in a world characterized by increasing complexity, conflict, and fragmentation.

A Definition of Interdisciplinary Studies

It is possible to identify key elements that practitioners agree should form the basis of an integrated definition of interdisciplinary studies:

- The focus of interdisciplinary research extends beyond a single disciplinary perspective.
- A distinctive characteristic of interdisciplinary research is that it focuses on a problem or question that is complex. (*Note:* We provide a precise definition of complexity further in text.)
- Interdisciplinary research is characterized by an identifiable process or mode of inquiry.
- Interdisciplinary research draws explicitly on the disciplines.
- The disciplines provide insights about the specific substantive focus of particular interdisciplinary research projects.
- Interdisciplinary research has integration as its goal.
- The objective of the interdisciplinary research process is pragmatic: to produce a cognitive advancement in the form of a new understanding, a new product, or a new **meaning**. (*Note:* The term *meaning* is important in the humanities, where it is often equated with the intent of the author or artist or the effect on the audience [Bal, 2002, p. 27].)[2]

From these elements, it is possible to offer this integrated definition of interdisciplinary studies:

Interdisciplinary studies is a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline, and draws on the disciplines with the goal of integrating their insights to construct a more comprehensive understanding.

This definition includes four core concepts—process, disciplines, integration, and a more comprehensive understanding—which are the subjects of later chapters. Importantly, this definition has both a *what* and a *how* component. Typically, when defining an experiment, one almost unavoidably describes how to do it. Chapters 1 and 2 of this book explain the *what* part; the rest of the chapters, which deal with the interdisciplinary research process, explain the *how* part. (*Note:* More detail on the historical evolution of this definition is provided in Repko, Newell, & Szostak [2012].)

Rick Szostak (2015b) notes that some philosophers, aware of the ambiguity of language, urge what are termed "extensional" definitions—which list examples of a thing—as a complement to (or even a substitute for) the sort of "intensional" definition above, which attempts to capture the essence of a thing in a couple of sentences. His extensional definition—which he intends as a complement to the above intensional definition—necessarily focuses on the ways in which **interdisciplinarity**, the intellectual essence of the field of interdisciplinary studies, is performed: It seeks to integrate insights from multiple disciplines after evaluating these in the context of disciplinary perspective.

> Interdisciplinarity involves a set of practices: asking research questions that do not unnecessarily constrain theories, methods, or phenomena; drawing upon diverse theories and methods; drawing connections among diverse phenomena; evaluating the insights of scholars from different disciplines in the context of disciplinary perspective; and integrating the insights of those disciplinary scholars in order to achieve a holistic understanding. (Szostak, 2015b, p. 109)

Much of this book will be devoted to outlining these very practices that collectively constitute interdisciplinarity.

THE INTELLECTUAL ESSENCE OF INTERDISCIPLINARITY

There are two dominant forms of interdisciplinarity: instrumental and critical. **Instrumental interdisciplinarity** is problem driven. It is a pragmatic approach that focuses on research, borrowing from disciplines, and practical problem solving in response to the external demands of society. Borrowing alone, however, is not sufficient; it must be supplemented by integration. For instrumental interdisciplinarity, it is indispensable to achieve as much integration as possible given the insights currently available from the contributing disciplines.

Critical interdisciplinarity seeks to transform the nature of the academy. It "interrogates the dominant structure of knowledge and education with the aim of transforming them, while raising epistemological and political questions of value and purpose" (Klein, 2010, p. 30). This focus is silent in instrumental interdisciplinarity. Critical interdisciplinarians

fault the instrumentalists for merely combining existing disciplinary approaches without advocating their transformation. Rather than building bridges across academic units for practical problem-solving purposes, critical interdisciplinarians seek to transform and dismantle the boundary between the literary and the political, treat cultural objects relationally, and advocate inclusion of marginalized cultures (Klein, 2005a, pp. 57–58).

These distinctions between instrumental and critical interdisciplinarity are not absolute or unbridgeable. Research on systemic and complex problems such as the environment and health care often reflects a combination of critique and problem-solving approaches. The integrated definition of interdisciplinary studies used in this book reflects an emerging consensus approach to the field: It is pragmatic, yet it leaves ample room for critique and interrogation of the disciplines, as well as economic, political, and social structures. This "both/and" approach is reflected in the definition of interdisciplinarity stated earlier: It refers to "answering a question, solving a problem, or addressing a topic," so it reflects an instrumentalist approach. But it also refers to "integrating [disciplinary] insights and theories to construct a more comprehensive understanding." Integrating disciplinary insights (i.e., their concepts and assumptions) or theories typically includes interrogating the disciplines. Similarly, constructing a more comprehensive understanding of a problem and communicating this understanding may involve raising philosophical and political questions or proposing transformative policies. Interdisciplinarity, then, "has developed from an idea into a complex set of claims, activities, and structures" (Klein, 1996, p. 209).

These two forms of interdisciplinarity share certain commonalities: assumptions, theories, and a commitment to **epistemological pluralism**. This refers to the diverse attitudes that disciplines have about how to know and describe reality. These commonalities constitute the intellectual essence of interdisciplinarity and provide coherence to this diverse field. We discuss them in turn below. (*Note:* This section draws heavily from Chapter 6 of Repko, Szostak, & Buchberger [2020], *Introduction to Interdisciplinary Studies,* third edition.)

Assumptions of Interdisciplinarity

All disciplines, interdisciplines, and fields of study are based on certain assumptions that provide cohesion to the field. In this regard, interdisciplinary studies is no different. There are at least four assumptions that anchor this diverse and rapidly evolving field, though the extent of agreement on each of them varies.

The Complex Reality Beyond the University Makes Interdisciplinarity Necessary

Broadly speaking, there are two categories of problems we face today: those that require a specialized disciplinary approach, and those that require a broader interdisciplinary approach. For example, a specialized disciplinary approach to the subject of freshwater scarcity could focus on depletion rates of freshwater aquifers (Earth

science), the destruction of wetlands (biology), or types of pollutants (chemistry). But the same topic of freshwater scarcity would require an interdisciplinary approach if you wanted to learn about it as a complex whole. This would require drawing not only on these disciplines, but also on political science (to investigate existing or needed legislation), economics (to evaluate costs of stiffer environmental regulations), and interdisciplinary fields such as environmental science.

The Disciplines Are Foundational to Interdisciplinarity

The disciplines are foundational to the unique purpose of interdisciplinarity, though this notion is vigorously contested by some critical interdisciplinarians (see Box 1.1). The integrated definition of interdisciplinary studies presented earlier makes this assumption explicit: Interdisciplinary studies is a cognitive process by which individuals or groups draw on *disciplinary perspectives* and integrate *disciplinary insights and modes of thinking* to advance their understanding of a complex problem with the goal of applying it. Interdisciplinarity, particularly in its instrumental form, is not a rejection of the disciplines; it is firmly rooted in them, but offers a corrective to their dominance. We need specialization. But we also need interdisciplinarity to broaden our understanding of complex problems. This "both/and" position is reflected, for example, in the interdisciplinary fields of health sciences and health services. It is also the position of this book and reflects the majority opinion in interdisciplinary literature.

BOX 1.1

Some interdisciplinarians . . . share an **antidisciplinary** view, preferring a more "open" understanding of "knowledge" and "evidence" that would include "lived experience," testimonials, oral traditions, and interpretation of those traditions by elders (Vickers, 1998, pp. 23–26). However, there is a problem with this approach. Without some grounding in the disciplines relevant to the problem, borrowing risks becoming indiscriminate and the result rendered suspect. Moreover, those who reject the knowledge claims of the disciplines altogether may be uncertain how to make knowledge claims other than on arbitrary grounds of life experience. Transdisciplinarity and integrative studies integrate disciplinary insights and nonacademic insights of various sorts.

The Disciplines by Themselves Are Inadequate to Address Complexity Comprehensively

Disciplinary inadequacy is the view that the disciplines by themselves are inadequate to address complex problems. This inadequacy stems from several factors:

- The disciplines lack breadth of perspective.
- The disciplines are unwilling to assume responsibility for offering broad-based and comprehensive solutions to complex societal problems.
- The disciplines possess an unreasonable certainty that they provide all that is needed to make sense of the modern world.
- The disciplines do not have the cognitive or methodological tools to make sense of complex reality and provide us with a complete picture.
- Integrative strategies are needed to combine the best elements of disciplinary insights into a more comprehensive understanding.

Underlying the assumption of disciplinary inadequacy is the judgment that disciplinary approaches are "partial" and "biased." They are partial in that a discipline views a particular problem through the lens of its own unique and narrow perspective. Economists, for instance, are skeptical of research from other disciplines because they value their own theories and methods, and they tend to ignore insights generated by alternate theories and methods (Pieters & Baumgartner, 2002). Disciplinary approaches are biased in that they are interested in only those concepts, theories, and methods that the discipline embraces, while rejecting different concepts, theories, and methods preferred by other disciplines. For example, although power is a concept relevant to virtually all the social sciences, each discipline has its own definition of power, and each definition is undergirded by certain assumptions, methods, and so forth that are unique to it. To gain a more balanced and comprehensive understanding of power as it relates to a problem, we must first understand how each discipline understands the concept of power before attempting to create common ground between these varied and conflicting notions.

Disciplinary inadequacy as applied to the health sciences is the subject of a study by Terpstra, Best, Abrams, and Moor (2010). Their conclusion is summarized in Box 1.2.

BOX 1.2

Over the last century, there have been many lessons learned in the health field. A key lesson is that health is a complex phenomenon and the underlying causal pathways for disease and illness are more than just biological. . . . Health is a phenomenon deeply rooted within a social system, and health outcomes result from a dynamic interplay between factors across

(Continued)

(Continued)

the lifetime, originating from the cellular level, to the socio-political level. . . . As such, efforts to improve health must consider the multifactorial nature of the problem and integrate appropriate knowledge across disciplines and levels of analysis. . . . Health research has implicated a myriad of factors involved in HIV prevention. . . . Unfortunately, incidence rates continue to rise because the knowledge is not being applied in the unified manner necessary to address the complexity of the problem. . . .

Unfortunately, the majority of health research is conducted for the sake of science, and not for the sake of dissemination and implementation. Knowledge created for science's sake tends to be discipline specific and reductionist, producing results that are not easily applied to inform practice and policy decisions. The reality is that health and health service challenges cannot be handled well by any single discipline or social sector, and the traditional reductionist approach to science does not work well for the majority of health service problems. Disciplinary knowledge and levels of analysis are intertwined in health service problems, and as such, application requires integrative theoretical models and knowledge. As stated by Rosenfeld (1992), "to achieve the level of conceptual and practical progress needed to improve human health, collaborative research must transcend individual disciplinary perspectives and develop a new process of collaboration" (Terpstra et al., 2010, p. 1344).

Source: Terpstra, J. L., Best, A., Abrams, D., Moor, G. (2010). Interdisciplinary health sciences and health systems. In Julie Thompson Klein & Carl Mitcham (eds.), *The Oxford Handbook of Interdisciplinarity*. OUP, Oxford.

Interdisciplinarity Is Able to Integrate Insights From Relevant Disciplines

It is feasible to integrate insights concerning a complex problem from relevant disciplines. This bold assumption is based not on wishful thinking, but on a carefully constructed process to achieve integration that instrumental interdisciplinarians have developed, and applied successfully, in recent years.

Theories of Interdisciplinary Studies

Theory refers to a generalized scholarly explanation about some aspect of the natural or human world, how it works, and how specific facts are related, that is supported by data and research (Bailis, 2001, p. 39; Calhoun, 2002, p. 482; Novak, 1998, p. 84). An example is the "broken windows theory of crime," which communicates the idea that seemingly trivial acts of disorder such as a broken window in a vacant house tend to trigger more serious crime in the neighborhood.

Every discipline embraces certain theories that provide its intellectual core and give it coherence. This is true also of interdisciplinary studies that draws on a body of theory to justify using an interdisciplinary approach and inform the research process. This body of theory includes theories on complexity, perspective taking, common ground, and integration.

Complexity

What distinguishes phenomena and problems that are merely complicated from those that are complex is the nature of the relationships among the parts. **Complexity** refers to the parts of a phenomenon or problem that *interact* in surprising/unexpected ways. **Interdisciplinary complexity theory** states that interdisciplinary study is necessitated when the problem or question is multifaceted and functions as a "system" (see Box 1.3). (*Note:* As used here, "system" does not imply either that the system tends toward equilibrium or that it is closed—that is, isolated from other phenomena—because in reality, almost all phenomena influence almost all other phenomena somehow.)

BOX 1.3

What do acid rain, rapid population growth, and the legacy of *The Autobiography of Benjamin Franklin* have in common? Though drawn respectively from the purviews of the natural sciences, social sciences, and humanities, they can be fruitfully understood as behaviors of complex systems, and they all require interdisciplinary study. Thinking of each of them as behavior of a particular complex system can help interdisciplinarians better understand such phenomena; collectively, they can help us better understand the nature and conduct of interdisciplinarity. . . .

In order to justify the interdisciplinary approach, its object of study must be multifaceted, yet its facets must cohere. If it is not multifaceted, then a single disciplinary approach will do (since it can be studied adequately from one reductionist perspective). If it is multifaceted but not coherent, then a multidisciplinary approach will do (since there is no need for integration). To justify both elements of interdisciplinary study—namely that it draws insights from disciplines and that it integrates their insights—its object of study must be represented by a system [that] must be complex. (Newell, 2001, pp. 1–25)

This raises the question of why complexity should be a criterion for interdisciplinary studies. The answer involves revisiting the definition of interdisciplinary studies provided earlier, noting two of its key elements: Interdisciplinary studies "*draws on disciplinary perspectives* and *integrate*[*s*] *their insights.*" The progression of thought, then, is as follows:

- Interdisciplinary studies draws on two or more disciplinary perspectives.
- Complex events or processes and behaviors have facets or parts that cohere.
- Each facet is typically the focus of a particular discipline.
- When the same facet is studied by more than one discipline, there are often conflicting insights generated.
- Understanding each facet involves drawing on the insights of the corresponding discipline(s).
- Understanding the complex phenomenon or behavior as a *whole* involves integrating insights from the relevant disciplines.

Interdisciplinary complexity theory also addresses the special case of the humanities and the arts. These disciplines are more concerned with behavior that is idiosyncratic, unique, and personal. The common practice in these disciplines is to practice **contextualization**. This is the practice of placing "a text, or author, or work of art into context, to understand it in part through an examination of its historical, geographical, intellectual, or artistic location" (Newell, 2001, p. 4). *Since complexity theory is concerned with the behavior of complex phenomena, and since contexts are themselves complex, the theory also provides a rationale for the interdisciplinary study of texts, artistic creations, and individuals that are unique and complex.*

Perspective Taking

Perspective taking is viewing a particular issue, problem, object, behavior, or phenomenon from a particular standpoint other than your own. As applied to interdisciplinary studies, **perspective taking** *involves analyzing the problem from the standpoint or perspective of each interested discipline and identifying their commonalities and differences.*

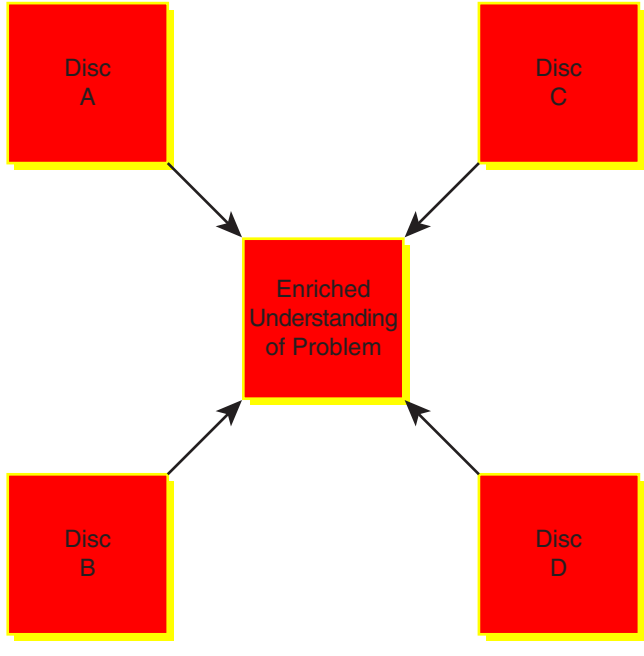
As developed by cognitive psychologists, perspective taking theory makes five important claims that are critical to your ability to engage in interdisciplinary work and function successfully in the contemporary world:

1. *Perspective taking reduces the human tendency to negatively stereotype individuals and groups* (Galinsky & Moskowitz, 2000). Assuming the position of the stereotyped individual, either virtually or actually (as John Howard Griffin did in *Black Like Me*), reverses your perspective. Holding a negative stereotype of an individual or group that is the object of study will certainly skew the interdisciplinary study and fatally compromise the resulting understanding. Stereotyping is inconsistent with good interdisciplinary practice.

2. *Perspective taking facilitates our ability to assemble new sets of potential solutions to a given problem* (Galinsky & Moskowitz, 2000; Halpern, 1996, pp. 1, 21). Here the old adage "there is wisdom in a multitude of counselors" applies: Examining the insights from the perspective of each interested discipline, even though they conflict, enriches your understanding of the problem and enables you to make creative connections (see Figure 1.1).

3. *Perspective taking heightens our awareness that we are biased in the direction of our own knowledge, whether it comes from our life experience or prior academic training.* In psychology, false-consensus bias is a cognitive bias whereby individuals tend to overestimate the extent to which their beliefs or opinions are typical of those of others (Fussell & Kraus, 1991; 1992). For example, after seeing a film, viewers who believe the film was excellent will tend to overestimate the percentage of people who thought that the film was excellent. The implication for interdisciplinary work is that we need to be aware of our biases, including disciplinary biases (which may have developed after majoring in a particular discipline), so that these do not prejudice (consciously or unconsciously) our analysis of the problem under study (Repko et al., 2020).

FIGURE 1.1 ⬢ Making Creative Connections



Source: Allen F. Repko.

4. *Perspective taking invites us to engage in role taking* (Martin, Thomas, Charles, Epitropaki, & McNamara, 2005, p. 141). There are three role-taking aspects of perspective taking, each of which is pertinent to interdisciplinary work:
   - *Accurately perceive how others see and understand the world*. This involves seeing ourselves as role takers much as those in the theater arts do as they assume the role of a character in a play. To engage in the interdisciplinary research process, we must consciously assume the role, if only briefly, of a disciplinary expert and view the problem through the expert's eyes. This role-taking ability is particularly important for those engaged in non-Western cultural studies, race and ethnic studies, urban studies, women's studies, sexuality studies, and other programs that emphasize difference.
   - *View a situation broadly from multiple perspectives* (Martin et al., 2005, p. 141). The implications for interdisciplinary process are obvious: We must not limit our inquiries to only those disciplines with which we are familiar or to those expert views with which we agree.
   - "*Perceive the other's perspective in depth and have a full understanding of the other's perspective*" (p. 141, italics in original). In interdisciplinary work, *depth* and *full understanding* refer to disciplinary depth. We will see in later chapters that interdisciplinary scholars can achieve the necessary level of understanding of disciplinary insights if they appreciate disciplinary perspective. This holds special significance for those in the humanities and fine and performing arts, where the ability to understand and even assume or appropriate the identity of another is a critical skill.

5. *Perspective taking involves holistic thinking.* **Holistic thinking** is the ability to understand how ideas and information from relevant disciplines relate to each other and to the problem (Bailis, 2002, pp. 4–5). Holistic thinking differs from perspective taking in this important respect: Perspective taking is the ability to understand how each discipline would typically view the problem, whereas holistic thinking is the ability to see the whole problem in terms of its constituent disciplinary parts. In holistic thinking, the focus is on the relationships of parts to the whole and on the differences between and similarities to other parts. The object of holistic thinking is to view the problem inclusively in a larger context rather than under controlled or restrictive conditions favored by disciplinary specialists. But "larger context" does not mean the most encompassing context possible. One actually wants the narrowest context possible that still encompasses everything needed to address the problem as a whole. Holistic thinking allows for seeing characteristics of a problem that are not apparent when studying the problem in disciplinary isolation. For example,

an interdisciplinary study of community art, usually seen as separate from urban economic development, may show how the community benefits socially, culturally, and economically (i.e., holistically) from various kinds of art. The goal or the product of holistic thinking is a more comprehensive understanding of the problem (discussed below). Overcoming monodisciplinarity, which focuses on a single academic discipline, involves deciding that other disciplines—their perspectives, epistemologies, assumptions, theories, and methods—are worth considering when studying a particular problem. Indeed, interdisciplinarians eventually come to value and seek other perspectives.

Common Ground

Although *common ground* does not appear in the definition of interdisciplinary studies presented earlier, it is implicit in the concept of integration. The interdisciplinary concept of common ground comes from cognitive psychology's theories of common ground and the emerging field of cognitive interdisciplinarity. These theories are introduced here but discussed more fully in Chapters 8 and 11.

Noted cognitive psychologist Herbert H. Clark (1996) defines common ground in social terms as the knowledge, beliefs, and suppositions that each person has to establish with another person to interact with that person (pp. 12, 116).

Cognitive psychologist Rainer Bromme (2000) applies Clark's theory of common ground to communication between disciplines. Whether developing a collaborative language for interdisciplinary research teams or integrating conflicting insights, the theory of cognitive interdisciplinarity calls for discovering or creating the "common ground integrator" by which conflicting assumptions, theories, concepts, values, or principles can be integrated.

Working independently of Clark and Bromme, William H. Newell (2001) was the first interdisciplinarian to define common ground in interdisciplinary terms. Common ground, he says, involves using various *techniques* to modify or reinterpret disciplinary elements (p. 20).

Newell's definition contains three ideas that are consistent with those of Clark and Bromme:

1. Common ground is something that the interdisciplinarian must create or discover.
2. Creating or discovering common ground involves modifying or reinterpreting disciplinary elements (i.e., concepts, assumptions, or theories) that conflict.
3. Modifying these elements to reduce the conflict between them involves using various techniques. (*Note:* These techniques are the subject of later chapters.)

Newell's particular contribution to understanding common ground is that it is what makes integration of disciplinary insights possible. In effect, Newell has illuminated the mysterious "black box" of interdisciplinary integration so that we can readily perceive how to create common ground and thus achieve integration.

A definition of common ground that integrates Newell's definition with the formulations of Clark and Bromme is as follows: **Common ground** is the shared basis that exists between conflicting disciplinary insights or theories and makes integration possible (Repko, 2012, pp. 56–57).

Integration

Integration is a process by which concepts, assumptions, or theories are modified to reconcile insights regarding the same problem from two or more disciplines. The purpose of interdisciplinary studies is not to choose one disciplinary concept, assumption, or theory over another, but to produce an even better understanding of the problem by integrating the best elements of competing concepts, assumptions, or theories. A primary focus of the debate over the meaning of interdisciplinary studies or interdisciplinarity concerns integration, which literally means "to make whole."

Practitioners are divided concerning the role of integration. **Generalist interdisciplinarians** understand interdisciplinarity loosely to mean "any form of dialog or interaction between two or more disciplines," while minimizing, obscuring, or rejecting altogether the role of integration (Moran, 2010, p. 14).[3]

Integrationist interdisciplinarians, on the other hand, believe that integration should be the *goal* of interdisciplinary work because integration addresses the challenge of complexity. Integrationists, pointing to a growing body of literature that connects integration with interdisciplinary education and research, are concerned with developing a distinctively interdisciplinary research process and describing how it operates (Newell, 2007a, p. 245; Vess & Linkon, 2002, p. 89). They advocate reducing the confusion about the meaning of *interdisciplinarity* and point to research in cognitive psychology that shows that the human brain is designed to process information integratively. *This book is aligned with the integrationist understanding of interdisciplinarity.*

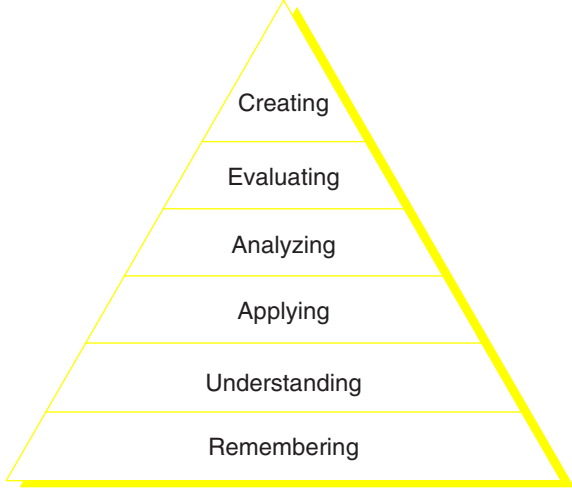
The core of the **integrationist position** is that integration is achievable and that researchers should strive for the greatest degree of integration possible given the problem under study and the disciplinary insights at their disposal. Importantly, integrationists point to recent theories supportive of integration advanced by cognitive psychologists, curriculum specialists, teacher educators, and researchers. Moreover, they point to the increasing amount of interdisciplinary work characterized by integration.

The idea for interdisciplinary integration is grounded in Bloom's classic taxonomy of levels of intellectual behavior that are involved in learning. Drawing on theories on learning and cognitive development, an interdisciplinary team of researchers and educators updated Bloom's taxonomy in 2000. The team identified six levels within the cognitive domain, with simple recognition or recall of facts at the lowest level through increasingly more complex and abstract mental levels, leading ultimately to the highest order ability, creating, as shown in Figure 1.2.

The significance of this taxonomy for interdisciplinary studies is that it elevates the cognitive abilities of creating and integrating to the highest level of knowledge. **Creating** involves putting elements together—integrating them—to produce something that is new and useful. As noted earlier, integration is the distinguishing feature of interdisciplinary studies and is at the core of the interdisciplinary research process. We will find at many points in this book that the literatures on creativity and on the interdisciplinary research process intersect, students learning how to do interdisciplinary research will expand their creative capabilities more generally.

Interdisciplinary integration finds additional support in the work of linguists George Lakoff and Gilles Fauconnier, and cultural anthropologist Mark Turner. Lakoff

FIGURE 1.2 ⬢ Updated Bloom's Taxonomy of Levels of Intellectual Behavior

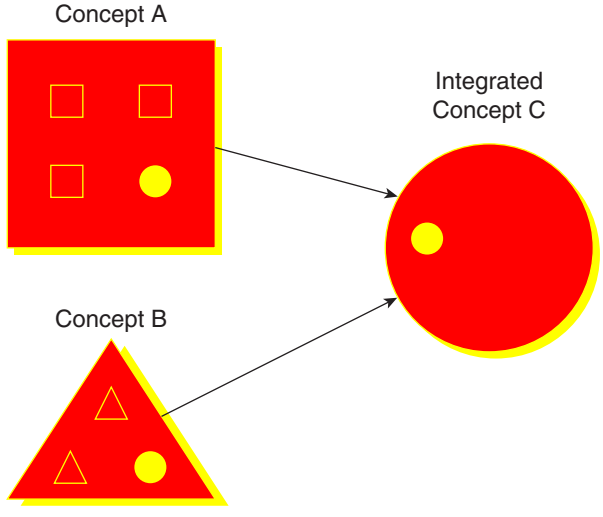


Source: Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives* (p. 28). New York: Longman. Reprinted by permission of Pearson Education, Inc. New York, NY.

(1987) introduced the **theory of conceptual integration** to explain the innate human ability to create new meaning by blending concepts and creating new ones (p. 335). Fauconnier (1994) deepened our understanding of integration by explaining how our brain takes parts of two separate concepts and integrates them into a third concept that contains some properties (but not all) of both original concepts. For example, the nickname "Iron Lady," referring to former British prime minister Margaret Thatcher, represents a conceptual integration of the concept iron, a metal used in construction because of its strength, with the concept lady, a woman who holds political rank. The implicit claim of the metaphor is that Margaret Thatcher acted *as if* she were made of iron (p. xxiii). Conceptual blending is possible because certain commonalities exist in the two original concepts that provide the basis for the new integrated concept. This third concept is different from either of the two original concepts. Figure 1.3 depicts this process.

Turner (2001) extends the theory of conceptual integration still further by arguing that we cannot fully appreciate a concept without understanding its cultural or historical context (p. 17). Accordingly, concepts (discussed in depth in Chapter 10) should be analyzed in the context and theoretical framework of the disciplines from which they come.

FIGURE 1.3 ⬢ Integrating Two Separate Concepts to Create a Third Concept



Source: Allen F. Repko.

From the discussion above, it is possible to construct a definition of integration as follows:

Integration is the cognitive process of critically evaluating disciplinary insights and creating common ground among them to construct a more comprehensive understanding. The new understanding is the product or result of the integrative process.

Epistemology of Interdisciplinary Studies

Epistemology involves questions such as "What can we know?" and "How can we know it?" Of the many ways that disciplinarity contrasts with interdisciplinarity, none is greater than their starkly different approaches regarding epistemology. Each disciplinary perspective involves a set of epistemological attitudes. Interdisciplinarity necessarily involves respecting these various epistemologies.

Some disciplines, especially in the natural sciences (but also economics to a considerable extent), believe that scholars can employ quantitative methods (notably experiments, statistical analysis, and mathematical modelling) to achieve very precise understandings of the phenomena that they investigate. Other disciplines, especially in the humanities, believe that scholarly understandings are always subjective to some degree and that the qualitative methods they employ (interviews, close reading of texts, surveys) cannot generate very precise understandings. Some scholars in these disciplines have come to doubt that any sort of objective understanding is possible: They see scholarship as only a game in which we argue for positions that we find congenial. (Note that all of these disciplines choose an epistemological outlook that reflects the nature of their favored methods. As noted above, disciplinary perspectives are internally consistent.)

Interdisciplinarity steers a path between two extremes. On the one hand, it rejects a "positivist" belief that scholarship advances by proving or disproving hypotheses. Philosophers of science now appreciate that it is always possible to interpret any research finding in multiple ways. On the other hand, interdisciplinary research must reject an alternative "nihilistic" belief that we are not able at all to advance human understanding through research. The middle-ground position, recommended by most but not all philosophers of science, is that scholarly understanding advances through careful amassing of evidence and argument. In the case of interdisciplinarity, we evaluate disciplinary insights, with a general expectation that these will be imperfect but contain some kernel of truth. We then seek a more comprehensive understanding that best fits our collective perception of the world (Szostak, 2007a). The interdisciplinary view that disciplinary insights are partial accords with contemporary philosophical understanding of epistemology (Welch, 2011).

Interdisciplinarians can practice epistemological pluralism, in which they respect the different epistemologies pursued in different disciplines (Welch, 2011). They can recognize that some disciplines may be too confident in their insights, and others perhaps too hesitant to reach firm conclusions. They can employ the interdisciplinary techniques of evaluation that we will outline in later chapters to critique insights from any discipline.

Note that epistemological pluralism supports a blend of instrumental and critical interdisciplinarity, as was advocated above: We are free both to draw upon and critique disciplinary insights and perspectives. Our interdisciplinary epistemological outlook is in turn grounded in an interdisciplinary ontology: our philosophical understanding of how the world works (as forcefully advocated by Bhaskar, Danermark, & Price, 2016). It is because the phenomena studied in one discipline interact in complex ways with the phenomena studied in other disciplines that we need interdisciplinary analysis to integrate across insights that can only be partial (see Henry, 2018).

DISTINGUISHING INTERDISCIPLINARITY FROM MULTIDISCIPLINARITY, TRANSDISCIPLINARITY, AND INTEGRATIVE STUDIES

Through articulating the nature of the interdisciplinary research process in later chapters, we can encourage rigor in interdisciplinary analysis. We have carefully defined and described interdisciplinary studies above to set the stage for discussion of that process. We can prevent unnecessary confusion with other terminology you may come across by carefully distinguishing here interdisciplinarity from multidisciplinarity, transdisciplinarity, and integrative studies.

Interdisciplinary Studies Is Not Multidisciplinary Studies

Some who are uninformed and outside the field mistakenly believe that *interdisciplinarity* and *multidisciplinarity* are synonymous. They are not. **Multidisciplinarity** refers to the placing side by side of insights from two or more disciplines. For example, this approach may be used in a course that invites instructors from different disciplines to present their perspectives on the course topic in serial fashion but makes no attempt to integrate the insights produced by these perspectives. “Here the relationship between the disciplines is merely one of proximity,” explains Joe Moran (2010); “there is no real integration between them” (p. 14). Merely bringing insights from different disciplines together in some way but failing to engage in the additional work of integration is

multidisciplinary studies, not interdisciplinary studies. **Multidisciplinary research** "involves more than a single discipline in which each discipline makes a *separate* contribution [italics added]" (National Academies, 2005, p. 27).

Lawrence Wheeler's instructive fable of building a house for an elephant (Wheeler & Miller, 1970) illustrates a typical multidisciplinary approach to solving a complex problem:

> Once upon a time a planning group was formed to design a house for an elephant. On the committee were an architect, an interior designer, an engineer, a sociologist, and a psychologist. The elephant was highly educated too . . . but he was not on the committee.
>
> The five professionals met and elected the architect as their chairman. His firm was paying the engineer's salary, and the consulting fees of the other experts, which, of course, made him the natural leader of the group.
>
> At their *fourth* meeting they agreed it was time to get at the essentials of their problem. The architect asked just two things: "How much money can the elephant spend?" and "What does the site look like?"
>
> The engineer said that precast concrete was the ideal material for elephant houses, especially as his firm had a new computer just begging for a stress problem to run.
>
> The psychologist and the sociologist whispered together and then one of them said, "How many elephants are going to live in this house? . . . It turned out that *one* elephant was a psychological problem but *two* or more were a sociological matter. The group finally agreed that though *one* elephant was buying the house, he might eventually marry and raise a family. Each consultant could, therefore, take a legitimate interest in the problem.
>
> The interior designer asked, "What do elephants do when they're at home?"
>
> "They lean against things," said the engineer. "We'll need strong walls."
>
> "They eat a lot," said the psychologist. "You'll want a big dining room . . . and they like the color green."
>
> "As a sociological matter," said the sociologist, "I can tell you that they mate standing up. You'll need high ceilings."
>
> So they built the elephant a house. It had precast concrete walls, high ceilings, and a large dining area. It was painted green to remind him of the jungle. And it was completed for only 15% over the original estimate.

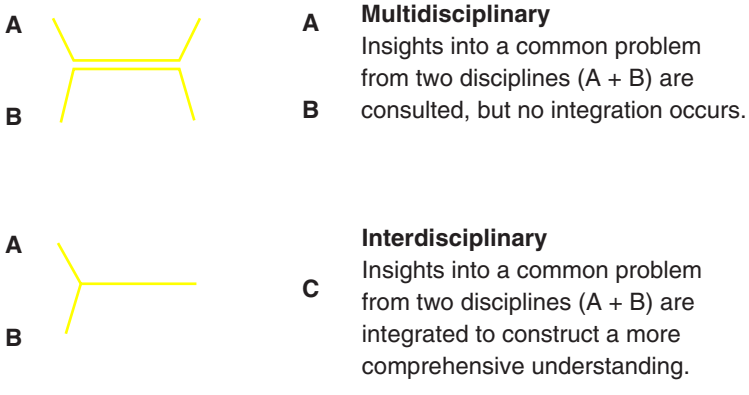
> The elephant moved in. He always ate outdoors, so he used the dining room for a library . . . but it wasn't very cozy.
>
> He never leaned against anything, because he had lived in circus tents for years, and knew that walls fall down when you lean on them.
>
> The girl he married *hated* green, and so did he. They were *very* urban elephants.
>
> And the sociologist was wrong too. . . . They didn't stand up. So the high ceilings merely produced echoes that greatly annoyed the elephants. They moved out in less than six months! (Wheeler & Miller, 1970, n.p.)

This fable shows how disciplinary experts usually approach a complex task: They perceive it from the narrow perspective of their specialty and fail to take into account the perspectives of other relevant disciplines, professions, or interested parties (in this case, the elephant).

This story also illustrates how a multidisciplinary approach to understanding a problem merely juxtaposes disciplinary perspectives. The disciplines speak with separate voices on a problem of mutual interest. However, the disciplinary status quo is not questioned, and the distinctive elements of each discipline retain their original identity. In contrast, interdisciplinarity consciously integrates disciplinary insights to produce a more comprehensive understanding of a complex problem or intellectual question.

Multidisciplinarity and interdisciplinarity have this in common: They seek to overcome the narrowness of disciplines. However, they do this in different ways. Multidisciplinarity means limiting activity to merely appreciating different disciplinary perspectives. But interdisciplinarity means being more inclusive of what disciplinary theories, concepts, and

FIGURE 1.4 ⬢ Difference Between Multidisciplinarity and Interdisciplinarity



Source: National Academy of Sciences, National Academy of Engineering, & Institute of Medicine. (2005). *Facilitating interdisciplinary research* (p. 29). Washington, DC: National Academies Press.