Interdisciplinary Research

Process and Theory

Third Edition

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1 Introducing Interdisciplinary Studies

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Chapter 1 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**

Chapter 1 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. So 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. An **insight** is a scholarly contribution to the clear 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), though many historians strive to be atheoretical. And 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 of modern criticism that calls for careful analysis of a text and close attention to individual words, syntax, 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, artifacts, 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.

The "Studies" Part of Interdisciplinary Studies

Studies typically refers to cultural groups (including women, Hispanics, and African Americans) and also appears 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
1. Claim a body of knowledge about certain subjects or objects	1. 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.
2. Have methods of acquiring knowledge and theories to order that knowledge	2. Makes use of disciplinary methods, but these are subsumed under a research process of its own that involves drawing on relevant disciplinary insights, concepts, theories, and methods to produce integrated knowledge
3. Seek to produce new knowledge, concepts, and theories within or related to their domains	3. Produces new knowledge, more comprehensive understandings, new meanings, and cognitive advancements
4. Possess a recognized core of courses	4. Is beginning to form a core of explicitly interdisciplinary courses
5. Have their own community of experts	5. Is forming its own community of experts
6. Are self-contained and seek to control their respective domains as they relate to each other	6. Draws on the disciplines for material (but some practitioners use mixed methods approaches, and would thus claim they are not reliant on disciplines for source material)
7. Train future experts in their discipline-specific master's and doctoral programs	7. 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 in order 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 if 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.

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:

- Interdisciplinary research has a particular substantive focus.
- 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.
- 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 interdisciplinary research.
- 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 [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.

> 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, 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 is society driven. 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 (also known as pragmatists) 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 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. These commonalities constitute the intellectual essence of interdisciplinarity and provide coherence to this diverse field. (Note: This section draws heavily from Chapter 6 of Repko, Szostak, & Buchberger [2014], *Introduction to Interdisciplinary Studies*.)

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 It 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 fresh water scarcity could focus on depletion rates of fresh water aquifers (Earth science), the destruction of wetlands (biology), or types of pollutants (chemistry). But the same topic of fresh water 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 (in order to investigate existing or needed legislation), economics (in order 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 *their 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 specializations. 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.
- The disciplines practice a "reductionist" research approach that does not allow for problem-based research. **Reductionism** is the strategy of "dividing a phenomena into its constituent parts and studying them separately in the expectation that knowledge produced by narrow specialties can be readily combined into the understanding of the phenomenon as a whole" (Newell, 2004, p. 2).

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 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, & Moor (2010). Their conclusion is summarized in Box 1.2.

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 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

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 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, Best, Abrams, & Moor, 2010, p. 1344).

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. 1–2)

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.

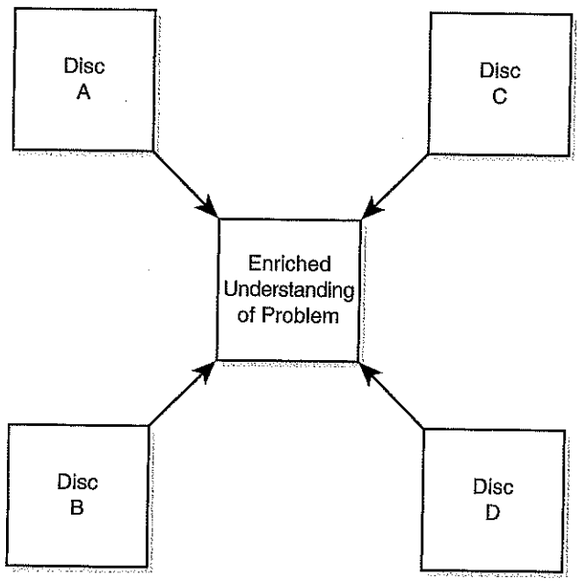
Interdisciplinary complexity theory also addresses the special case of the humanities and the arts. These disciplines are more concerned with behavior that is idiosyncratic, unique, and personal. The common practice in these disciplines is to practice **contextualization**, which we discuss in a later chapter. 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).

FIGURE 1.1 Making Creative Connections



Source: Allen F. Repko.

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.

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. 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 Though *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 in order 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 in order 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.*

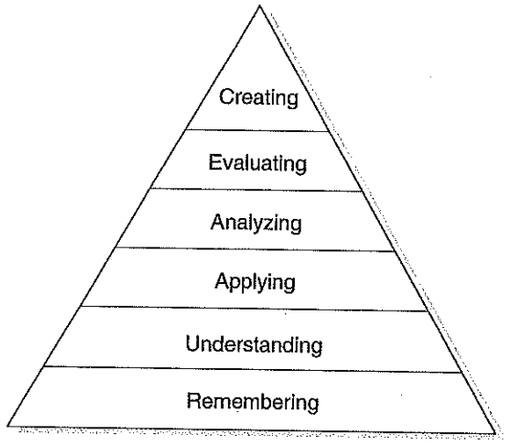
The core of the **integrationist position** is that integration is achievable and that researchers should strive for the greatest degree of integration possible given the problem under study and the disciplinary insights at their disposal. Importantly, integrationists point to recent theories supportive 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, coherent, and whole. As noted earlier, integration is the distinguishing feature of interdisciplinary studies and is at the core of the interdisciplinary research process.

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

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

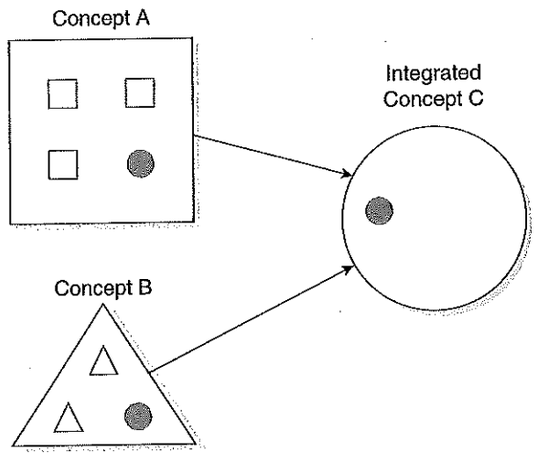


Source: Anderson, Lorin W., Krathwohl, David R., Airasian, Peter W., Cruikshank, Kathleen A., Mayer, Richard E., Pintrich, Paul R., Raths, James, Wittrock, Merlin C. (2001). *A Taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives* (p. 28). New York: Longman. Reprinted by permission of Pearson Education, Inc. New York, NY.

Lakoff (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.

Epistemological Pluralism A critical part of interdisciplinarity, and part of its attraction, is its adherence to **epistemological pluralism**. This refers to the diverse approaches that disciplines use to know and describe reality. Epistemological pluralism rejects notions of absolute truth and embraces the ambiguity that arises out of conflict and difference. In this way, knowledge emerges from the cross-fertilization of different perspectives.

How Epistemological Pluralism Integrates Critical and Instrumental Modes of Interdisciplinarity Importantly, epistemological pluralism integrates the critical and instrumental modes of interdisciplinarity noted earlier. Inspired by the writings of Jacques Derrida and Michael Foucault, critical interdisciplinarity arose in response to science's utter reliance on reason and empirical evidence as *the* way to know truth (Welch, 2011, pp. 16–17).

Over time, "the interdisciplinary idea evolved from a mere critique of the disciplines to the more sophisticated and pragmatic mission of negotiating within and beyond the epistemological frameworks they project" (p. 32). The beginnings of instrumental interdisciplinarity emerged from the idea that truth is not established by authorities but is worked out through the exchange of ideas. *Interdisciplinarity rejects neither rationalism nor empiricism, but instead recognizes the partial nature of disciplinary insights.*

This idea led to another idea: that *progress can result from the interplay of ideas.* In this idea, we find the origins of "core interdisciplinary values, including tolerance for ambiguity, appreciation of diversity, and the utilitarian goal of progress through complex problem solving" (Welch, 2011, p. 21).

How Epistemological Pluralism Addresses Complexity Complexity has become the cornerstone of interdisciplinarity for good reason. Instead of reducing phenomena to simple structures or idealized models, the theory of epistemological pluralism "approaches knowledge as open-ended and ill-defined, acknowledging its dependence on context, and focusing on relationships between [system] elements" (Welch, 2011, p. 32).

> [Y]et this indicates that interdisciplinarity . . . is working through knowledge systems toward a more integrative creation of new knowledge. . . . Interdisciplinary theory attempts to bring insights from different perspectives into a cohesive understanding of complex phenomena applied toward progress, and in this way fundamentally synthesizes postmodern and pragmatic schools of thought, along with the critical and instrumental modes derived from them. . . . As an epistemology of complexity, interdisciplinary theory established equilibrium between absolutism and nihilism, asserting that knowledge is progressive, while also pragmatic. (Welch, 2011, pp. 32, 34–35)

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 (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.)

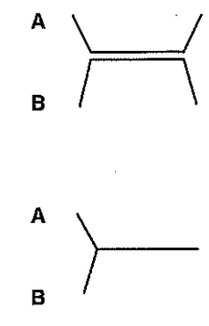
This fable shows how disciplinary experts usually approach a complex task: They perceive it from the narrow (i.e., monistic) perspective of their specialty and fail to take into account the perspectives of other relevant disciplines, professions, or interested parties (in this case, the elephant).

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 methods are appropriate to a problem. It also means being open to alternative methods of inquiry, using different disciplinary tools, and carefully estimating the degree of usefulness of one tool versus another to shed light on the problem (Nikitina, 2005, pp. 413–414).

Research is truly interdisciplinary, states the National Academies (2005), "when it is not just pasting two disciplines together to create one product but rather is an integration and synthesis of ideas and methods" (p. 27). Figure 1.4 shows the difference between multidisciplinarity and interdisciplinarity.

FIGURE 1.4 Difference Between Multidisciplinarity and Interdisciplinarity



Multidisciplinary
A insights into a common problem from two disciplines (A + B) are
B consulted but no integration occurs

Interdisciplinary
A insights into a common problem from two disciplines (A + B) are integrated to construct a more comprehensive understanding
C

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

Interdisciplinary Studies Is Not Transdisciplinary Studies

Complementary to interdisciplinarity, **transdisciplinarity** involves the integration also of *insights generated outside the academy*, a team approach to research, the active involvement of nonacademic participants in research design, and a "case study" approach. For example, if investigating environmental degradation in a particular area, transdisciplinairians would seek insights from local people on both the causes and potential solutions of environmental challenges (Bergmann et al., 2012). Whereas an interdisciplinary scholar might tackle the general problem of economic development, a transdisciplinary scholar would more likely focus on development challenges in a particular locality.

None of these elements contradict the practice of interdisciplinarity, which can also involve insights, team research, and drawing on life experience and expertise outside the academy. We might think of transdisciplinarity as "interdisciplinarity plus," where additional constraints (noted above) are placed on the transdisciplinary researcher.

NOTE TO READERS

In this book, we focus on interdisciplinarity. But we will have occasion to discuss team research. Some of the numerous examples of interdisciplinary analysis provided in what follows qualify as case studies. And some of these examples do indeed draw on insights generated beyond the academy.

Interdisciplinary Studies and Integrative Studies

Integrative studies is often used in the contemporary academy to indicate something more than just integrating insights from different disciplines. It is similar to transdisciplinarity in that it seeks to integrate differences in perspective and terminology across social groups of various types as well as disciplines. Students integrate what they learn in their courses with their life experiences in various social and cultural settings, including residence life and volunteering (Hughes, Muñoz, & Tanner, 2015).

While integrative studies and interdisciplinarity do not share the same boundaries, they do share important points of overlap. Integration, perhaps the most important step in the interdisciplinary research process, is called for in all aspects of our lives. The integrative skills that interdisciplinary students will master are useful more generally in life. These students will be well suited to the needs of employers for workers that can integrate diverse bits of information into a coherent strategy. They will be better prepared not only for the world of work, but also to participate as members of their community in facing today's complex challenges.

The Differences Between Multidisciplinarity, Interdisciplinarity, Transdisciplinarity, and Integrative Studies Summarized

- Multidisciplinarity studies a topic from the perspective of several disciplines at one time but makes no attempt to integrate their insights. Multidisciplinary approaches tend to be dominated by the method and theory preferred by the home discipline.
- Interdisciplinarity studies a complex problem (including mega ones) by drawing on disciplinary insights (and sometimes stakeholder views) and integrating them. By employing a research process that subsumes the methods of the relevant disciplines, interdisciplinary work does not privilege any particular disciplinary method or theory.
- Transdisciplinarity is best understood as a type of interdisciplinarity that stresses team research, a case study approach, and especially integrating not just across disciplines but also beyond the academy.
- Integrative studies is similar to transdisciplinarity in that it seeks to integrate differences in perspective and terminology across social groups of various types as well as disciplines.

CHAPTER SUMMARY

Interdisciplinary studies and interdisciplinarity are evolving and dynamic concepts that are now mainstream in the academy. The chapter focuses on the meaning of each term, unpacking the field's DNA in terms of its assumptions, theories, and epistemology. It examines various conceptions of interdisciplinarity including generalist, integrationist, critical, and instrumental. And it discusses how interdisciplinarity differs from multidisciplinarity, transdisciplinarity, and integrative studies.

Chapter 2 introduces the disciplines and their perspectives, describes how knowledge is typically reflected in the organization of the academy, and presents an in-depth discussion of disciplinary perspective.

NOTES

1. For the limited purposes of this book, references to *disciplines* are limited to the traditional lists of major disciplines rather than the much fuller contemporary taxonomies unless otherwise noted. References to specific interdisciplines and schools of thought (e.g., feminism, Marxism) are appropriately identified.
2. In the humanities, students are required to choose a definition of meaning: artist intent, audience reaction, and so on. However, Rick Szostak (2004) argues that the interdisciplinary conception of "meaning" should urge students to embrace all possible definitions and the causal links they imply. Students "could still choose to specialize with respect to one of these (or not) without needing to assume the others away" (p. 44).
3. Some generalists such as Moran see the terms *interdisciplinarity* and *integration* as synonymous with *teamwork* as in team teaching and cross-disciplinary communication on research projects (Davis, 1995, p. 44; Klein, 2005b, p. 23; Lattuca, 2001, p. 12). Other generalists such as Lisa Lattuca (2001) prefer to distinguish between types of interdisciplinarity by focusing primarily on the kinds of questions asked rather than on integration (p. 80). Still other generalists such as Donald G. Richards (1996) go so far as to reject any definition of interdisciplinary studies that "necessarily places priority emphasis on the realization of synthesis [or integration] in the literal sense" (p. 114).

EXERCISES

Defining for Clarity

1.1 You saw in this chapter the importance of defining the controversial and misunderstood term *interdisciplinary studies* in order to reveal its true meaning. Can you think of another controversial or misunderstood term whose true meaning could be clarified by studying its definition in a similar manner?

What and How

1.2 Definitions of some terms contain both a *what* and a *how* component. This is true of the integrated definition of interdisciplinary studies that appears in this chapter. Identify which part of the definition is the *what* and which is the *how*.

Dominant Forms

1.3 Which form of interdisciplinarity, instrumental or critical, would most likely yield a more comprehensive understanding of why newly arrived immigrants typically resist (at least initially) assimilating into the majority culture?

Assumptions

1.4 Is the assumption that the complex reality beyond the university makes interdisciplinarity necessary justified? If so, why? If not, why not?

1.5 This chapter has argued that interdisciplinarity should be viewed as complementary to the disciplines rather than as a threat to them. In your view, what is the most compelling argument that can be made for a "both/and" rather than an "either/or" position?

1.6 Why should a person's life experience be considered less or more valid than a disciplinary insight published in a scholarly journal?

1.7 Identify a health issue or a health service challenge that could benefit from an interdisciplinary approach (see quote in Box 1.2).

Complexity

1.8 In interdisciplinary work, why must the object of study be complex?

Perspective Taking

1.9 Explain the relationship between perspective taking and holistic thinking.

Integration

1.10 Explain why creating is so closely associated with interdisciplinary studies.

Epistemology

1.11 Explain why epistemological pluralism is considered a key component of interdisciplinarity.

Inventory

1.12 Examine your university's undergraduate and/or graduate curriculum to determine how much interdisciplinary activity exists on campus.

1.13 How might your institution's general education curriculum be made more interdisciplinary?

Building Houses for Elephants

1.14 The fable of the elephant house is instructive to those who are engaging in a complex enterprise such as building a house. Think of another complex enterprise that is planned or already under way in your community and apply the lessons of the elephant house to it.

1.15 Is there a transdisciplinary aspect to the elephant house project? If so, what is it, or if not, what should it be?