CHAPTER 9

# Thinking Critically About Integration and Its Results

We have said that the idea of interdisciplinarity is embodied in varied and multifaceted "studies" and programs. Yet depending on the subject and disciplines involved, these often hold very different conceptions of interdisciplinarity, approach integration differently, and produce a wide range of results. Chapter 6 introduced the concept of interdisciplinary integration, examined the controversy between generalists and integrationists, and identified the theories supportive of the integrationist position that informs this book. This chapter builds on that discussion by introducing four commonly used approaches to integration. It concludes by examining the result of integration, which is a "more comprehensive understanding" of the subject under study.

## Learning Outcomes

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

- Understand the meaning of interdisciplinary integration
- Understand four commonly used approaches to achieve integration
- Explain the strengths and limitations of each approach
- Recognize examples of creating common ground and performing integration using assumptions and concepts
- Understand the meaning of the term *more comprehensive understanding*
- Explain the core premises underlying the term *more comprehensive understanding*

## Approaches to Interdisciplinary Integration

In contrast to many of the multiple definitions of interdisciplinarity noted in Chapter 3, only a few authors define "interdisciplinary integration." For example, Yassin, Rahman, and Yamat (2010) define it as "how the facts, concepts and generalizations in the various disciplines are held in common," implying that some undefined process is at work (p. 377). Repko and Szostak (2016) offer a more detailed definition that focuses on process: Interdisciplinary integration is "the cognitive *process* [emphasis added] of critically evaluating disciplinary insights and creating common ground among them to construct a more comprehensive understanding" (p. 221). In this definition, "process" refers to what goes on

in interdisciplinary thinking. These definitions, though different, agree on two points: (1) The disciplines are foundational to interdisciplinary study, and (2) integration is an integral part of interdisciplinary studies.

Interdisciplinarians have developed four approaches to integration. The first three, *contextualization*, *conceptualization*, and *problem centering,* reflect, respectively, the nature and structure of knowledge primarily in (1) the humanities and fine and performing arts, (2) the sciences, and (3) the applied fields. *These are not well-developed approaches. Nor is much written on how these ad hoc approaches should be performed.* Our purpose in presenting brief overviews of these approaches is to acknowledge that some practitioners use them. However, there is a more concrete approach that we call the Broad Model that subsumes and supersedes these three more partial approaches. That is, the Broad Model integrates the best elements of these other approaches to interdisciplinary integration. This model is our primary focus.

## Integrative Approach 1: Contextualization

*Contextualization* is an approach used by humanists and those in the fine and performing arts to embed the object of study in the fabric of time, culture, and personal experience. Under this approach, the process of integration is not standardized and varies from context to context. There are multiple ways to contextualize knowledge, and we touch upon three of these here: history, metaphysics, and epistemology (Nikitina, 2006, p. 257).

**History as Integrative Context** Using history as the integrative context involves connecting different disciplinary insights and pieces of knowledge to a moment or event in time. For example, answering the question "Why did the American Civil War break out in 1861?" involves integrating insights from science and technology (to explain the significance of the invention of the cotton gin), economics (to explain the slave-owning South's dependence on cotton production and the plantation system), religion (to explain the splits within the major Christian denominations over the issue of slavery that provided theological underpinnings for abolitionist and pro-slavery stances), literature (to explain the profound impact of Harriet Beecher Stowe's *Uncle Tom's Cabin* on the North), psychology (to explain the emotional impacts of increasing incidents of violence such as John Brown's raid on Harper's Ferry), and politics (to explain the rise of the Republican Party and the election of Abraham Lincoln).

**Metaphysics as Integrative Context** A second way humanist and fine and performing arts interdisciplinarians approach integration is to pose philosophical or broad metaphysical questions (e.g., Who am I? What is the purpose of my existence? What do I believe?) as vehicles for connecting and integrating multiple

disciplinary insights. The question of the meaning of life can be addressed by viewing the paintings by Édouard Manet and Jean Courbet (art history), reading the philosophical theories of Karl Marx and Soren Kierkegaard (philosophy), examining representative texts from various faith traditions (religious studies), studying the text of Katherine Mansfield's story "Garden Party" (1988) or Samuel Beckett's play *Waiting for Godot* (1949) (literature), and then integrating one's reflections (that is, the disciplinary insights one draws from each) on these (Nikitina, 2006, p. 258).

**Epistemology as Integrative Context** A third approach is to use epistemology as the integrative context. An epistemological approach to understanding the human condition is distinctive (as compared to a historical or metaphysical approach) because of its specific focus on the act of knowing. Here "disciplinary perspectives are connected, not by historical events or ethical or philosophical questions, but through belonging to a particular mode of reasoning and meaning-making" (Nikitina, 2006, p. 259). For example, poetry and mathematics take different paths toward knowing what is true and define "knowing" in different ways. For poetry, knowing comes from subjective experience and our five senses. Poetry awakens our senses, connects us with ourselves and others, and leads us to think in synthesizing ways by using the language of analogy and metaphor (Hughes, 2007, p. 1). For mathematics, knowing is based on objective reality (truths exist independently of our ability or lack of ability to find them, and they do not change). However, mathematics, like poetry, also uses analogy to extend the boundaries of what is known and unknown and to create new forms of expression (Birken & Coon, 2001). Growney (2008) thus argues that mathematics and poetry require similar kinds of creativity and that mathematics provides "precise and vivid imagery" for poems. In turn, physicists exploring subatomic reality rely heavily on mathematical models but often also pursue analogy or poetry in order to visualize this reality (Lederman & Hill, 2011). It is thus both possible and useful to integrate these two different ways of knowing.

Using an epistemological approach to achieve integration of disciplinary insights often involves focusing on disciplinary assumptions. Every discipline is based on certain assumptions (discussed in Chapter 5) that limit understanding of the subject matter and force us to look at it in a certain way. By uncovering each discipline's assumptions about reality (and more narrowly about the specific subject under study), we see not only how disciplinary systems of knowing differ but also how they are complementary or connected as they seek to make meaning of the world around us. For example, historian of science Zajonic (1993) in *Catching the Light: The Entwined History of Light and Mind* captures the crossing of scientific and philosophical ways of knowing into the nature and

meaning of light, claiming that the integration of physical and psychological perspectives is the only way to go. He writes,

> Light . . . has been treated scientifically by physics, symbolically by religious thinkers, and practically by artists and technicians. Each gives voice to part of our experience of light. When heard together, all speak of one thing whose nature and meaning has been the object of human attention for millennia. During the last three centuries, the artistic and religious dimensions of light have been kept severely apart from its scientific study. . . . The time has come to welcome them back, and to craft a fuller image of light than any one discipline can offer. (Zajonic, 1993, p. 8)

**Example of a Contextual Integration** Interdisciplinarians working primarily in the humanities and the fine and performing arts engage in interdisciplinary integration in ways that are quite different from those used by interdisciplinarians working in the sciences and the applied fields. For one thing, they often resist the drive for a single best integration of disciplinary insights. Instead, they prefer to lay out the range of possibilities for integration because they wish to respect the deliberate ambiguity inherent in the art object or text they critically examine. For another, these authors do not seek to integrate on behalf of others, as interdisciplinarians in the sciences and the applied fields do, by presenting their integration as a finished product. Instead, humanists and those in the fine and performing arts seek to draw others (audiences, viewers, readers) into the integrative process and encourage them to participate in a *shared* integrative experience. In other words, these scholars set up integration (usually implicitly) by offering prompts that suggest some starting points for viewers to engage in integration themselves (Newell, 2012, p. 301).

This approach is exemplified by Mieke Bal, who comes out of the humanities and the fine and performing arts (hereafter the humanities). In this excerpt, she explains how and why those in the humanities approach interdisciplinary integration differently than those in the sciences and the applied fields:

> The objects of study in much of the humanities are generally works of art and their historical, philosophical and theoretical contexts. [These works are] traditionally "high art" but also more widely circulating cultural objects, often referred to as "popular culture." This simple fact prescribes a research agenda a bit different from that in other fields. First, the artworks—literary, theatrical, cinematic, visual, musical—demand to be treated with due respect as complex artifacts made by people, for

people, to intervene in the cultural life of communities. Second, the examination of their cultural role also demands a critical perspective, which frequently leads to evaluative assessments. Most importantly and thirdly, their genre affiliations have dictated the formation of disciplines and their methods. With the advent of artifacts that can no longer be confined to such labels as "painting," "sculpture," or "film," the awareness has grown that . . . many artworks fit uneasily in the disciplinary categories designed for their study. Just think of opera. Finally, the fact that these objects are made by people for people gives them a historical position as well as a social function. The need to understand that position and that function is a fourth reason why research in the humanities tends to exceed the disciplinary frameworks designed to understand these objects. . . .

[M]odels of interdisciplinarity that work well for other domains may not be the most productive to address the specific research questions humanists develop. In particular, both the respect due to the objects and the need to analyze critically if and how they serve the people they address in the most adequate way are two requirements potentially in tension with each other. Tension, therefore, is indispensable, and sometimes overrules the wished-for integration. Here lies in my view the specific contribution of the humanities for our reflection of how to do interdisciplinary research. (Bal, 2012, pp. 91–92)

The object of Bal's study is an anonymous love poem (introduced in Chapter 7) written in yellow paint on a red brick wall of a bombed-out building in post–World War II Amsterdam:

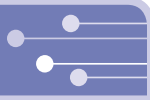
Note
I hold you dear
I have not
Thought you up

Bal's goal is to present possible integrated meanings of the poem based on insights from literature, linguistics, art, and philosophy. From a literature perspective, the poem is a particular form of discourse intended to publicize someone's views. From linguistics, the poem seems to say, "Look!"—often implying, "That's how it is." From the perspective of art, the "Look!" aspect is

reinforced by the visual contrast of the bright yellow handwriting on the red bricks of the wall. From epistemic philosophy, the "I have not thought you up" or "That's how it is" aspect involves the authority of the author, who knows from personal experience the heartbreak of loss and is willing, for some reason, to make this emotion public. Bal (1996) creates common ground between these disciplinary insights by focusing on their one commonality: They are all gestures intended to *expose* something about the writer, the beloved, and those viewing the poem (then and now) and pondering its meaning (p. 2). Having made these disciplinary connections and presented these prompts, Bal leaves it to the reader (or viewer) to engage in the actual process of integration, thereby making it personal, creative, and subjective.

**Strengths and Limitations of Approaches to Contextual Integration** Contextualization approaches to interdisciplinary integration allow humanists to enable readers and viewers to make highly creative and far-reaching connections among disciplinary insights. This includes the sciences *when* the goal is to place science in the cultural and historical fabric of time and bring out its social responsibility (see Box 9.1). A limitation of the contextualization approach is that it leaves out other critical elements of the contributing disciplines such as their specific assumptions, concepts, theories, and methods. Nor can contextualization substitute for other integrative strategies (Nikitina, 2006, p. 260).

## Box 9.1 Scientific Wisdom



[Scientists in the twenty-first century] do not lack technical expertise; they lack wisdom. We live in a world where biology enables our ability to manipulate the human genome . . . [which] is far ahead of our legal or philosophical ability to regulate how to use this knowledge in fruitful ways. . . . How do we help scientists think in an ethical context? How do we help scientists decide whether or not certain questions should be pursued? (Nikitina, 2006, p. 260)

### Integrative Approach 2: Conceptualization

Conceptual integration seeks "to make meaning from different concepts that, on the surface, have no apparent connection or commonality" (Morrison, 2003, p. 1). The approach is based on a general theory of cognition that describes how elements from different contexts are "blended" in a subconscious process known as "conceptual blending" thought to be common in everyday thought and language. As James L. Morrison (2003) explains,

> Two concepts are integrated into a third concept that contains some properties of both original concepts, but not all of the properties of the two original concepts. Commonalities of the two original concepts provide the basis for an emerging concept that is different from either of the two original concepts. The literature refers to the concepts as mental spaces, and the conceptual integration as the blending of the spaces. (p. 1)

Nikitina (2006) reports that conceptualizing is an integrative strategy used widely in the sciences and is designed to take scientific and mathematical thinking beyond the facts to the level of the underlying concepts. Such core concepts as *linearity, change,* and *scale*, she says, can effectively tie together algebra and geometry, physics, and biology, illuminating a hidden pattern of relationships. Conceptualization, she adds, provides a strong model for integrative work because it proceeds from factual and technical information to the level of conceptual abstraction from which generalization becomes possible (Nikitina, 2006, p. 261.)

**Strengths and Limitations of the Conceptual Approach to Integration** A major strength of this integrative approach is its rigorous correlation of related (i.e., not too epistemologically distant) knowledge and rich exchange in discipline-specific content (i.e., facts, theories, methods; Nikitina, 2006, p. 262). However, the conceptualization approach is limited in three respects. First, it limits the breadth of disciplinary connections to disciplines and their insights that are epistemologically close. Second, it obscures the process by which integration occurs. And third, though it properly emphasizes achieving integration at the start of the project, it neglects to identify points along the way where taking additional integrative actions or reflecting on earlier steps is likewise essential.

## Integrative Approach 3: Problem Centering

The **problem-centering** or instrumental approach to integration uses issues of public debate, product development, or policy intervention as focal points for making connections between disciplines and integrating their insights. For example, the Center for Bioethics at the University of Pennsylvania brings together all the disciplinary tools it can to bear on such complex and vital issues as human cloning, stem cell research, and organ transplantation. Unlike contextualization and conceptualization, which focus on promoting self-understanding or building coherence among concepts, problem centering is

aimed at generating tangible outcomes and change. This approach is attractive to the applied sciences, business, technology, and the fields of applied social science that aim to create new products, improve on existing conditions, or develop policies for social change. Other users of this approach include such interdisciplinary fields as bioethics, public health, and environmental studies (Nikitina, 2006, p. 263).

The epistemological goal of this model is not so much to make knowledge personally meaningful (as in contextualization), or to advance fundamental knowledge (as in conceptualization), but to attack a pressing problem by drawing on *all* available disciplinary tools in order to resolve it.

Ruth Beilin (2012) presents a case study illustrating how integration by problem centering works. The problem facing the researchers was how to help farmers in the highly eroded and steep hill country of Victoria, Australia, change their farming practices in the face of deteriorating climate conditions. Beilin describes what she and her fellow researchers faced:

> The contested values between conservation and production associated with the landscape meant there were sensitivities regarding how much land could be "taken out of production" for "tree planting"; and because of the strong need to remain financially viable, local farmers were suspicious of someone asking the question in that way. (p. 98)

The challenge was to integrate the apparently conflicting needs for production *and* conservation. The researchers succeeded in helping the farmers, suspicious of outside "experts" from the city, view the problem of declining productivity from a system perspective. By placing their farms in the broad context of the region as a whole, they were able to conceive of the landscape as the place where social and ecological systems are intertwined. This integrated understanding was aided by a model of how water moved through the farming landscape with eight suggestions for improving recharge (i.e., capturing and retaining rainfall) and minimizing erosion. As a result, the farmers' concept of land stewardship changed as they engaged with the practical outcomes of changing their approach to managing their farms (Beilin, 2012, p. 109).

**Strengths and Limitations of the Problem-Centering Approach** In its focus on the human predicament, the problem-centering approach may seem similar to the humanities-based contextualization approach. However, the two approaches engage human concerns in different ways. In contextualization work, the goal is to attain a deeper understanding of the human condition,

whereas in problem-centering work, "the fundamental metaphysical questions of 'who we are' and 'why are we here' are distinctly secondary to the primary goal of finding causes and cures for human calamities" (Nikitina, 2006, pp. 265–266).

A major strength of the problem-centering approach is its emphasis on the development of a solid understanding of the relevant disciplines with an activist view of how to put the disciplines at the service of the problem. The approach does not hesitate to draw on disciplines that are epistemologically distant as long as these are relevant to the problem. Practitioners are willing to borrow theories and methods that seem like they may be useful.

However, the problem-centering approach suffers from four limitations. First, the disciplinary "tools" that it uses are primarily methodological (i.e., quantitative or qualitative) and tend to exclude other tools that may be equally relevant to the problem, such as each contributing discipline's perspectives, assumptions, concepts, and favored theories. Second, there is no systematic process for choosing the best theories, methods, or disciplines, or for placing disciplinary insights in context. The approach may thus borrow without much question from works that are viewed with suspicion in their home discipline. Third, the problem is seldom mapped to reveal its complexity and causal links. This omission tends to obscure difference or conflict between disciplinary perspectives on the problem (see the following discussion). Fourth, the process of how integration actually occurs tends to be obscured by the primary focus of the approach, which is on blending viewpoints (in an additive way), articulating the author's personal stand on the issue, and formulating a policy or recommending legal action (Nikitina, 2006, p. 264).

## The Broad Model Approach to Integration

The Broad Model that we introduce here reflects the instrumentalist focus on problem solving (Chapter 3) and subsumes the approaches of contextualization, conceptualization, and problem centering addressed earlier. The model defines "problem" broadly to include almost any line of inquiry that requires an interdisciplinary approach. The model is "broad" because it

(a) draws on *all* disciplines for insights whether they are epistemologically distant or close;

(b) uses *all* "disciplinary tools" including assumptions, concepts, theories, and methods to study a problem;

(c) maps complex problems to reveal their complexity and causal links;

(d) critically evaluates disciplinary insights as well as stakeholder views (provided that these reflect disciplinary thinking);

(e) makes the process of integration explicit and transparent by breaking it down into discrete STEPS that require reflecting on earlier STEPS; and

(f) creates common ground among disciplinary insights on the basis of one or more key assumptions, concepts, or theoretical explanations, thereby melding conflicting insights until the contribution of each becomes inseparable. Importantly, what the model integrates are *not disciplines or their perspectives* but the insights they generate. Table 9.1 compares the Broad Model to the other approaches.

## Examples of How the Broad Model Integrates

In the following sections, we present two examples of how the Broad Model integrates, each preceded by a brief discussion of whether this is achieved by focusing on assumptions or concepts.

**Working With Assumptions** A possible source of conflict between insights is the assumptions that underlie each discipline, and thus the insights that they produce. An assumption is something taken for granted, a supposition. These assumptions are accepted as the truths upon which the discipline is based. Stated another way, a discipline's defining elements—its theories, concepts, and methods—are simply the practical manifestations of its assumptions. Grasping the underlying assumptions of a discipline as a whole provides important clues to the assumptions underlying the writings of its experts on a particular problem and often proves useful in creating common ground (Repko, 2008, p. 89).

Consider Allen Repko's (2012) study of the causes of suicide terrorism where each author advances a particular theory, based on research, to explain the cause of this horrific behavior. He begins by probing the assumptions of each prominent theory and notes that some assumptions are shared by more than one theory.

Table 9.1 Comparison of Approaches to Integration

| Approach | Category | Goal | Method | Integration |
|---|---|---|---|---|
| Contextualization | Humanities and the fine and performing arts | Deeper understanding of the human condition | Contextualization and other methods (see Tables 5.9 and 5.10) | Prompts provided but integration is left to the reader or viewer. In the performing arts, the product (the performance or art installation) is itself an example of integration. |
| Conceptualization | Sciences | Extend scientific knowledge | Scientific methods (see Tables 5.9 and 5.10) | Integration is typically limited to developing a common language |
| Problem Centering | Social sciences and applied fields | Solution to practical problems | Methods limited to quantitative and qualitative approaches | Additive: "blending" of views |
| Broad Model* | All categories | All goals | Uses *all* defining elements of disciplines, including assumptions, concepts, and theories | Makes process of integration explicit and transparent by using STEPS |

*The cognitive process involved in performing integration is both compelling and elusive. It is compelling because the idea of integration is heavily supported by theory; it is elusive because, other than the Broad Model, none of the specialized approaches delineates explicit actions, operations, or steps that make it possible (but not inevitable in every case) to achieve integration in a wide range of contexts.

> For example, the psychology theories of terrorist psycho-logic (Post), self-sanction (Bandura), and martyrdom (Merari) share the assumption typical of psychology: understanding the behavior and motivation of suicide terrorists requires studying the mental life and psychological constructs of individual terrorists. The [political science] theories of strategic rational choice (Crenshaw), sacred terror (Rapoport), and identity (Monroe and Kreidie) share the assumption that suicide terrorists follow logical processes that can be discovered and explained. These theories also assume

> that the primary focus of study should be the behavior of terrorist groups rather than the behavior of individual terrorists. But only sacred terror theory and identity theory assume that a terrorist's religious affiliation is an effective way to explain the "political" phenomenon of suicide terrorism. Fictive kin theory (Atran) assumes that the determining factor in shaping the development of a suicide terrorist is the terrorist's loyalty to an intimate cohort of peers, all of whom share an intense devotion to religious dogma. This theory shares with identity theory the assumption that religion is an important factor in understanding the development of a suicide terrorist. Finally, modernization theory (Lewis) rests on the assumption that suicide terrorism is the result of Islam's failure to embrace Western institutions and values. (pp. 139–140)

At first glance, these different disciplinary theories and their conflicting assumptions appear unbridgeable. However, the Broad Model emphasizes the critical importance of discovering or creating common ground between conflicting insights by focusing on the assumptions, concepts, and theories underlying them. Once this commonality is identified, integration can proceed. In the present case, Repko (2012) discovered that these theories shared a deeper assumption that provides the basis for their integration:

> A key assumption of self-sanction theory (Bandura) is that understanding the behavior and motivation of suicide terrorists requires studying *primarily* the mental life and the psychological constructs of *individual* terrorists. By contrast, the key assumption of identity theory (Monroe and Kreidie) is that understanding the behavior and motivation of suicide terrorists requires studying their cultural as well as their religious identity, but not at the expense of taking into account personality traits (inherent and acquired). However, a deeper probing of the assumptions of both theories reveals a commonality that both share, namely the *goals* of suicide terrorists. These are not defined in terms of self-interest, as rational choice advocates (e.g., Crenshaw and Rapoport) would have it, but rather as "moral imperatives" or "sacred duties." This deeper assumption is also shared by the theories of fictive kin (Atran), strategic rational choice (Crenshaw), "sacred terror" (Rapoport), martyrdom (Merari), terrorist psycho-logic (Post), and modernization (Lewis). *The common ground assumption shared*

> *by all of the theory-based insights to varying degrees, then, is that the goals of suicide terrorists are "moral" and "sacred"—and thus, rational as defined by Islamic fundamentalism* [emphasis added]. (p. 145)

Clearly, using assumptions to explain a complex behavior such as suicide terrorism does not erase all differences between the various conflicting insights and theories. Instead, it focuses on the fundamental commonality of almost all the theories, namely, the goals that these terrorists share.

**Working With Concepts** When working with concepts, interdisciplinarians pay close attention to how the *same concept* may have different meanings when used by different disciplines within the context of the *same* problem. For example, the concept "efficiency" has quite different meanings for economists (money out/money in), biologists (energy out/energy in), and political scientists (influence exerted/political capital expended) (Newell, 2001, p. 19).

Interdisciplinarians are also alert to how experts from different disciplines use *different concepts* in their discussion of the same problem. And they are able to distinguish between cases in which these different concepts refer to *quite different things* and cases where different concepts have *overlapping meanings*. Both are common occurrences. From these, it is often possible to identify one concept that can be modified by redefining it. This interdisciplinary move brings out its common meaning, making it applicable to different disciplinary texts and contexts.

When redefining a concept, interdisciplinarians avoid using terminology that tacitly favors one disciplinary approach at the expense of another. Using the technique of redefinition can reveal commonalities in concepts that may be obscured by discipline-specific language. Once this language is stripped away, the concept can be redefined, enabling it to become the basis for creating common ground between the conflicting insights. Sometimes this occurs in conjunction with other integrative techniques, as shown in the following example of student work.

Janet Delph (2005) demonstrates the usefulness of the Broad Model when working with concepts to achieve integration. She questions whether advances in criminal investigatory techniques are able to eliminate the possibility of the "perfect crime." She defines a "perfect crime" as one that goes unnoticed and/or for which the criminal will never be caught. Of the several disciplines and subdisciplines that are relevant to crime investigation, Delph finds three most relevant: criminal justice, forensic science, and forensic psychology. She identifies

the current theories embraced by these rapidly evolving subdisciplines and finds that the source of conflict between them is their preference for two different investigatory methods and reliance on two kinds of evidence. Forensic science analyzes *physical* evidence, whereas forensic psychology analyzes *behavioral* evidence. Each approach constructs a "profile" of the criminal, with forensic science using physical evidence and forensic psychology using a combination of intuition informed by years of experience and information collected from interviews and other sources.

Delph (2005) creates common ground between the conflicting approaches by redefining the concept of profiling to include both forensic science, with its emphasis on physical evidence, and forensic psychology, with its emphasis on "intuition" born of extensive experience and insights derived from crime scene analysis. This redefinition of criminal profiling enables her to bridge the physical (i.e., forensic science) and behavioral (i.e., forensic psychology and criminal investigation) sciences. Forensic scientists do not need to use profiling as long as they have adequate evidence to analyze. But in the absence of such evidence, profiling can move the investigation forward by using a combination of "intuition" born of extensive experience and insights derived from crime scene analysis (p. 29). In this way, the redefined concept of profiling serves as common ground between the specialized knowledge that criminal investigation, forensic science, and forensic psychology offer (Repko & Szostak, 2016, p. 281).

## "Partial" and "Full" Integration

The four approaches to integration raise these questions: What does integration change, and does integration change only the contribution of each discipline or are the disciplines themselves somehow changed? The answer to these questions is that it depends on which approach is used. Contextualization, conceptualization, and problem-centering approaches focus on *which* of several contributing disciplinary elements—that is, assumptions, concepts, theories, and methods—to use in performing integration. The chosen element remains unchanged and acts like a magnet around which other elements gather or are "integrated." Under these approaches, the integration may be considered "partial" because the contributing elements are not changed. However, users of the Broad Model maintain that these contributing elements must change for common ground to be created and "full" integration achieved. The important point is not so much whether integration is "partial" or "full" (though the latter is preferable to the former) but that integration is actually taking place.

As important as integration is, it is not the end of the interdisciplinary enterprise. Integration is the process used to achieve the ultimate goal and purpose of interdisciplinary work, which is to produce an interdisciplinary result.

## Strategies for Integration

Four useful strategies have been identified for integrating insights that appear to disagree. These are briefly described here; more detail and many examples of their application are provided in Repko and Szostak (2016).

*Redefinition* involves carefully analyzing the way that key concepts are used within different insights. It will often be found that scholars only appear to be disagreeing because they are employing words in different ways. We have illustrated earlier how redefinition can be employed in practice. Van der Lecq (2012) was able to achieve an integrated understanding of the evolution of human language capability by reconciling different usages of the word "evolution" by different authors. In some cases it may be necessary to identify different meanings of a term (Bergmann et al., 2012).

*Organization* involves mapping the different arguments made by different authors. We have already seen in Chapter 8 how the act of mapping can identify how the insights of different authors might be seen as complements rather than substitutes. Authors may be disagreeing simply because each stresses the importance of the phenomena they study and ignores the phenomena studied by others.

*Extension* involves extending the analysis of one discipline (or an interdisciplinary field) so that it includes insights from other fields. A theory, for example, can be extended to include variables suggested by other disciplines. Such an approach flows naturally from a suggestion in Chapter 8: We should ask of every disciplinary insight what is missing. Repko (2012) was able in his study of suicide terrorism to extend one theory to embrace concerns raised by alternative theories once he had identified a common assumption across theories.

*Transformation* involves placing seeming opposites along a continuum. We discussed in Chapter 8 a hypothetical analysis by an economist of rational calculations by a potential criminal. A sociologist might suggest instead various nonrational influences on behavior. As noted in Chapter 8, the potential criminal is likely neither perfectly rational nor completely nonrational. Rather, we can imagine a continuum from perfect rationality to perfect nonrationality. Then we can consider where along that continuum a particular person might fall

in a particular situation. Rather than choosing between the economist's and sociologist's insights, we can weight these appropriately in developing a more comprehensive understanding of criminal behavior.

## The Result of Integration

We come now to the possibilities that are opened up as a result of creating common ground and performing integration. These possibilities are summed up in the term "more comprehensive understanding" of the subject, problem, or question.

### A More Comprehensive Understanding

We define **more comprehensive understanding** as a cognitive advancement that results from integrating insights that produces a new whole that would not be possible using single disciplinary means. Authors use a variety of other terms that have similar meanings, such as *holistic understanding, interdisciplinary understanding, integrative understanding,* and *interdisciplinary product;* what one calls the understanding that results from integration is a matter of preference.

Unpacking the definition of "more comprehensive understanding" deepens our understanding of it:

- "More comprehensive" means that the interdisciplinary result "combines more elements than does any disciplinary understanding or theory" (Repko & Szostak, 2016, p. 323).
- "Cognitive advancement" refers to a variety of possible outcomes such as explaining a process, solving a problem, creating a product, or raising a new research question in ways that would have been unlikely through single disciplinary means (Boix Mansilla, 2005, p. 16).
- "New" refers to the improbability of any one discipline or mode of thinking (e.g., Marxism, postmodernism) producing a similar result, and that "no one (other than the interdisciplinarian) takes responsibility for studying the complex problem, object, text, or system that falls between the disciplines or that transcends them" (Repko & Szostak, 2016, p. 324).
- "Whole" refers to the comprehensiveness of the research result: "It cannot be reduced to the disciplinary insights from which it emerged" (Repko & Szostak, 2016, p. 238).

## Core Premises That Underlie the Concept

Boix Mansilla (2005) identifies four core premises that underlie the concept of more comprehensive understanding:

1. "It builds on a performance view of understanding—one that privileges the capacity to *use* knowledge over that of *having* or *accumulating* it [emphasis added]" (pp. 16–17). This is consistent with both the critical and instrumental approaches to interdisciplinarity discussed in Chapter 3. For example,

   > We understand the psychological construct "theory of mind" (that is, an individual's recognition of others' mental state, beliefs, and intentions) when we can use the concept to explain why a given child might be unusually empathetic, or how a political campaign manager makes strategic decisions. From this vantage point, understanding the concept of "theory of mind" is a high order cognitive endeavor that goes beyond simply having an accurate definition of the term. (p. 17)

2. It "is 'disciplined'—i.e., deeply informed by disciplinary expertise."

   > An interdisciplinary explanation of a phenomenon like autism, for instance, differs from a naïve or "commonsense" explanation in that it builds on insights that have survived the scrutiny of expert communities such as neurology or psychology using commonly agreed upon methods and validation standards. And while such disciplinary insights are clearly open to further revision, they embody the most reliable and up-to-date accounts of the natural and social world available. (p. 17)

3. "It involves the integration of disciplinary views." In interdisciplinary work, disciplinary insights are not merely compared to each other or added together but actively inform one another, thereby leveraging understanding. For instance,

   > In exploring the phenomenon of autism, the psychological concept of "theory of mind" (a missing construct among

autistic individuals) enables us to characterize expected patterns of behavior in a child. In turn, such patterns provide adequate categories with which to study the autistic brain and begin to explain behavior at a neurological level. It is in epistemic exchanges of this kind, in this instance between psychology and biology, that an interdisciplinary "whole" stands as more than the sum of its disciplinary parts. (p. 17)

4. It "is purposeful." Integrating disciplinary insights and modes of thinking are not ends in themselves but a means to achieve a cognitive advancement such as a new insight, a solution, an account, or an explanation.

   In interdisciplinary work, many integrations are possible and viable. Autism, for example, can be explored at the crossroads of psychology and sociology by examining the unique forms of social discrimination associated with autistic children. Or it could be investigated at the crossroads of neurology and medical ethics if one intended to experiment with novel medical procedures. (p. 17)

The interdisciplinary understanding is the product of, but distinct from, the various contributing disciplinary insights into the problem. The resultant "interdisciplinary 'whole,'" Boix Mansilla (2005) says, "stands as more than the sum of its disciplinary 'parts'" (p. 17). The metaphor, model, narrative, new question or avenue of research, new physical product, new policy, plan, program, or schema each expresses the integration between the parts and whole of the problem.

## Reflecting on What Was Achieved

This chapter concludes Part II of the book, which explains how you can become a critical user of both disciplinary and interdisciplinary work. By now, you should be beginning to think like an interdisciplinarian and understand how to approach complex problems. Specifically, you have learned to recognize and think critically about disciplinary perspectives. You have also learned how to recognize and think critically about disciplinary insights and the importance of mapping them. Finally, you have learned to recognize and think critically about interdisciplinary integrations and understandings.

For some readers, the journey to becoming interdisciplinary ends here. For those of you who are expected to do interdisciplinary work of your own, your journey continues into Part III. These next chapters provide practical advice on how to engage in the interdisciplinary research process yourself and evaluate your work as you go.

## Critical Thinking Scenario

You have been called on to evaluate whether a student project is interdisciplinary. Based on your understanding of this chapter, what questions or criteria would you use to evaluate the student's project? Justify each criterion.

## CRITICAL THINKING QUESTIONS

1. Describe the key elements of the four approaches to integration and how the Broad Model subsumes the first three.
2. Why is the Broad Model broad?
3. Why do we value "more comprehensive understanding"?

## APPLICATIONS AND EXERCISES

1. Discuss in what situations the four strategies for integration are best employed.
2. Politicians often give opposing arguments on key issues of public policy. Identify one such disagreement and discuss in a group how (and how well) strategies of integration might be employed.
3. Could the Broad Model also be employed in the pursuit of *critical* interdisciplinarity?