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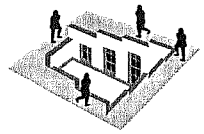
Chapter One

Transdisciplinarity

Disciplinary to Transdisciplinary Knowledge-Building



Disciplines, like nations, are a necessary evil that enable human beings of bounded rationality to simplify the structure of their goals. But parochialism is everywhere, and the world sorely needs international and interdisciplinary travelers who will carry new knowledge from one enclave to another.

—Nobel Prize recipient, Herbert Simon (1992, 269)

The international research community has entered a new era characterized by *transdisciplinary research practices*. The cumulative impact of transdisciplinary perspectives and innovations is a new paradigm. Over the last few decades transdisciplinarity has grown rapidly in medical/health research, environmental research, sustainability research, educational research, policy research, and social research. The main focus of this book is on transdisciplinarity in relation to social research questions that often originate in the social sciences, education and health studies.

As will be noted throughout this book, the beginnings of scholarship were actually more transdisciplinary than we have seen over the past century. From early links between mathematics and poetry, astronomy and mythology, and science and rhetoric, holistic approaches to knowledge-building developed as a result of an emphasis on idea generation. The disciplining of knowledge-building practices was constructed as a means of organizing universities far more than advancing ideas. Interestingly, despite the disciplining of research institutions, which in turn require undergraduate and graduate students to specialize in at least one discipline,

most universities and colleges require students to take core courses that often focus on the early holistic "thinkers" such as early Greek or Renaissance scholarship—I myself was required to take several such courses. With this said, the modern academy has been based on the creation and maintenance of disciplinary borders. Therefore, the recent growth in transdisciplinary approaches to research signifies a major turn in how social research is conceived and conducted. The deep sharing of information and research tools across disciplinary borders and the development of new conceptual frameworks have been important and fruitful with respect to moving the scientific community forward in three major ways.

First, it has freed researchers from the limits of working with their disciplinary tools alone. This has fostered an enormous expansion of social research. Second, the ability to use additional tools and resources has allowed research questions to be asked from more diverse perspectives. Increased empirical diversity has also facilitated theoretical advancements as well as the realization of theoretical promises. Third, and perhaps most significantly, the transdisciplinarity of research methods has caused an erosion of the basis upon which disciplinary borders have historically been formed and maintained. This has prompted a series of re-evaluations of research tools as well as scientific criteria for evaluating research. Concurrently, as borders shift, new research collaborations have led to the asking of new research questions and the creation of new, hybrid research tools, designed to address those questions. These factors have culminated in the development of transdisciplinary research practices.

Transdisciplinarity is an approach to conducting social research. Transdisciplinary research practices are issue- or problem-centered approaches to research that prioritize the problem at the center of research over discipline-specific concerns, theories or methods. Transdisciplinary research is responsive to (public) needs. Transdisciplinary research practices transcend disciplinary borders and open up entirely new research pathways. Transdisciplinarity produces new knowledge-building practices.

Furthermore, transdisciplinary practices are forging coalitions and collaborations across disciplinary and geographic borders. The merging of different national perspectives, coupled with cross-disciplinary pollination, is vital towards making academic research an authentic part of the globalized world it claims to study. In this regard, transdisciplinary practices have forged a growing transnational research community. Moreover, transdisciplinary approaches to research are

extending public scholarship and promoting research practices that engage with public needs.

All disciplines offer unique but limited perspectives onto the social reality they study. By cultivating these perspectives in academic training and then liberating researchers from working exclusively within their confines, the research community is able to go further than ever before in our quest to understand and intervene in our rapidly changing world. The implications are both theoretical and methodological. It is an exciting time.

The Continuum: Disciplinarity, Multi-Disciplinarity, Interdisciplinarity and Transdisciplinarity

Before reviewing the major approaches to research, and the extent to which each prompts interaction (and in some cases integration) among disciplines (Flinterman, Teclemariam-Mesbach, Broerse & Bunders 2001), it is important to note that there is nothing inherently good or bad about any of these approaches. Different research topics, purposes and questions may lead to different approaches. In some contexts a disciplinary approach may be what is required, whereas in others a transdisciplinary approach may yield more fruitful results. It is important, however, that as a research community we embrace these different approaches so that we expand the possible topics and questions we can address, not limit them. The goal of this book is to review transdisciplinary approaches and therefore I compare disciplinary, multi, inter, and transdisciplinary approaches—placing them on a continuum and pointing to their differences and limitations. In this chapter I will use the example of "bullying" in order to show how disciplinary, multi-disciplinary, interdisciplinary and transdisciplinary approaches may lead researchers to tackle this topic differently. I have selected the topic of bullying because it is of wide-reaching concern to researchers across the social and behavioral sciences, education and the humanities. While I ultimately focus on the strengths and *usefulness* of transdisciplinarity, this is in no way meant to minimize the important research conducted from these other approaches. Moreover, when speaking in generalizations (which out of necessity I do when reviewing the characteristics of each approach), there will of course be claims made that do not fit every research project. As Lincoln and Guba famously observed, "The trouble with generalizations is that they don't apply to particulars" (2000, 27).

Disciplinarity

Historically, knowledge has been produced within disciplines (or monodisciplines as they are sometimes called). Disciplines remain the most common sites for knowledge generation. When thinking about how disciplines function, the term "disciplinary codes" (Steinmetz 2007) is useful because it implies that disciplines have ritualized or coded ways of building, evaluating and disseminating knowledge.

In the simplest of terms disciplines are detailed knowledge areas with distinct borders. Disciplines have common research objects, questions, methodological tools and exemplary cases (Greckhamer, Koro-Ljungberg, Sebnem & Hayes 2008). Here are a couple of examples of how researchers applying a disciplinary lens might come to study bullying:

- A Psychologist may develop a small-scale research project in order to examine the psychological effects of bullying on the bullied in a particular environment. Theories and methods commonly used in psychology, such as cognitive interviewing, would be employed.
- A Sociologist may develop a small-scale research project in order to examine the role of peer culture in bullying (such as the social structure of popularity within a school context). Theories and methods commonly used in sociology, such as ethnography or questionnaires, would be employed.

Disciplines also have prevailing worldviews or paradigms that are widely shared (Greckhamer et al. 2008; Kuhn 1996). This is evidenced in the preceding examples. The psychologist is applying a psychological perspective as he or she considers the issue of bullying and therefore is guided by a focus on psychological processes and/or outcomes. In contrast, the sociologist is guided by a sociological perspective as he or she considers the issue of bullying and therefore is guided by a focus on the social context in which bullying occurs.

Of course some disciplines are characterized by further divisions where multiple and competing paradigms co-exist and, at times, challenge and push each other (such as the qualitative and quantitative paradigms in sociology and psychology, for example). Nevertheless, each discipline has one or more shared sets of assumptions about how research ought to be conducted. The assumptions are not "natural" but rather constructed by those within the discipline. Disciplines are created and sustained by the definitions members of the discipline create and maintain (P. Berger, B. Berger & Keller 1973). It is in this way that "disciplinary codes" and disciplinary lenses become normalized.

Professionals within disciplines also develop a shared language or "disciplinary discourse" (Greckhamer et al. 2008; Klein 1990). Disciplinarity breeds isolation and exclusivity with respect to other disciplines because, in part, it is difficult to communicate without a shared language (Austin, Park & Goble 2008). Disciplines do much more, however, than tell researchers what to study and how to study it. They in fact become communities in which researchers operate. Each community has its own set of professional expectations and demands. In short, pressures. Disciplines serve to create the kinds of researchers we become by organizing research activities and professional development, thus building professional identities. For example, disciplines dictate what professional activities are appropriate and what knowledge will be recognized and valued (including what will be published, what will receive funding, what will earn faculty tenure). Therefore, embedded within the context of institutionalized incentives, disciplinary structures determine what knowledge will be produced (Greckhamer et al. 2008). As Greckhamer and colleagues observe, disciplines "control and standardize knowledge production" (p. 312). Kuhn (1963) famously noted that members of disciplines are specialists who together build a scientific community based on shared assumptions. Kuhn further explained, "Members communicate with their community, share basic assumptions and examples about meaningful problems, standards, for reliable and valid methods, as well as what is considered a good solution to a problem" (quoted by Hadorn, Hoffmann-Riem, Biber-Klemm, Grossenbacker-Mansuy, Joye, Pohl, Weismann & Zemp 2008, 27–28). The stronger disciplinary boundaries have become, the more pressure there has been for further specialization even within one's own discipline. As a result, the range of what one can study has become more narrowly defined. As specialization has increased, researchers have followed the same career paths, and thus disciplinarity has become further institutionalized. So the question becomes: is there another path?

> Two roads diverged in a wood, and I—
> I took the one less traveled by
> And that has made all the difference.
>
> (Robert Frost, The Road Not Taken, 1920)

Many scholars suggest that research approaches in which different disciplines interact and/or integrate (such as interdisciplinary and transdisciplinary approaches) expose the limitations of disciplinarity (for example see Klein 2004). Narrow experts cannot address the fundamental issues facing humanity in contemporary society (Klein 2004). As interdisciplinary and transdisciplinary scholars suggest, social problems and issues don't develop according to our disciplinary structure. Mittelstrass (1992) expresses this well: "Nowadays, problems seldom do us the favor of letting themselves be defined according to the order of our scientific habits" (as quoted in Pohl & Hadorn 2007). Many problems are by nature transdisciplinary and, therefore, so must be our attempts to deal with them. As suggested earlier, this does not necessarily mean we abandon our disciplinary training.

Multi-Disciplinarity and Interdisciplinarity

Multi-, inter, (and trans) disciplinarity, in that order, exist on a continuum of increasing interaction and integration between disciplines. Newell (2000) provides the following model for thinking about the continuum of interaction between disciplines, beginning with the least level of disciplinary interaction (multi-disciplinary):

- *cooperate* (disciplines engage in parallel play);
- *appreciate* (disciplines come to understand each other's perspective);
- *dismantle* (disciplines bring to light and debate each other's assumptions);
- *reconstruct* (disciplines work together to develop overarching concepts);
- *modify* (disciplines shift time-horizon assumptions, or methods to collaborate); and
- *transform* (disciplines are so altered that they cannot return to business as usual). (p. 230)

Multi-Disciplinarity

Multi-disciplinary approaches to research involve collaboration between two or more disciplines on a research project; however, each discipline maintains its own assumptions, values, and methods. In other words, each discipline maintains its autonomy during the collaboration (Wickson, Carew & Russell 2006). Borders are left intact during multi-disciplinary collaboration as distinct disciplines "co-exist" within a project (Johnson 2001, 270). Returning to the bullying example we can see this at work:

→ A Psychologist and a Sociologist may partner to conduct research on bullying in schools. Each researcher would separately create his or her agenda and research protocol, with minimal, if any, collaboration. For example, the Psychologist might engage in a cognitive interviewing protocol in order to develop a profile of the effect of bullying on the bullied. The Sociologist might conduct in-depth interviews with school age children in order to understand the peer culture in which bullying occurs. The researchers may co-author an article in which they each review their findings, or separately author discipline-specific articles.

Austin and colleagues (2008) define multi-disciplinary approaches as, "representatives from several disciplines, each contributing particular knowledge and methods from their respective fields" (p. 557). Similarly, Russell, Wickson and Carew (2008) write: "Disciplinary specialists work together maintaining their disciplinary approaches and perspectives" (p. 460). Other definitions of multidisciplinarity point to the inherent limitations of these approaches. For example, Flinterman and colleagues (2001) offer the following definition: "When a variety of disciplines collaborate in one research program without integration of concepts, epistemologies, or methodologies... the degree of integration between disciplines is restricted to the linking of research results" (p. 257). The word "linking" is important as it connotes a scenario in which research results are "added" to each other, in which one set of results "augments" another. In this respect McDonell (2000) notes that researchers have an "associative" relationship in multi-disciplinary projects and each "adds" their work to the others' (p. 27). Many scholars note a major limitation of multi-disciplinary research is the lack of "cross-fertilization" between disciplines because the disciplines remain "self contained," and therefore there is a lack of "synergy" among outcomes (for example see Bruce, Lyall, Tait & Williams 2004; Hadorn et al. 2008). (As will be noted shortly, *synergy* is a key factor that distinguishes transdisciplinarity from all other models of knowledge production.) Given the lack of synergy present in multi-disciplinary collaborations, it is not surprising that some scholars suggest the outcome of the research may not be greater than the sum of its parts (McMichael 2000).

There is also the issue of the kinds of research topics that are likely

to prompt multi-disciplinary partnerships. Because disciplinary methodologies are maintained, multi-disciplinary research projects usually involve researching disciplinary themes or topics (Wickson et al. 2006) and thus do not necessarily inspire the asking of radically different research questions. In this respect, multi-disciplinary approaches to research essentially offer a slightly broader perspective or multi-perspectival view on traditional research questions.

Interdisciplinarity

Interdisciplinary approaches to research also involve collaborations between researchers from two or more disciplines. It is generally understood that there is a greater level of interaction between the disciplines in interdisciplinary research. However, it is not surprising that the literature on interdisciplinarity presents a wide array of views on how interdisciplinarity works and how much interaction and integration is actually fostered in these partnerships. While there are many nuances I am not going to address, for simplicity I suggest that the two major lines of thought center on whether or not disciplines maintain clear distinctions in interdisciplinary work.

Some researchers contend that, as with multi-disciplinary research, disciplinary borders are maintained in interdisciplinary research (Steinmetz 2007). In this vein, some view interdisciplinarity as a "process of juxtapositioning" disciplines (Cameron & Mengler 2009, 194), which implies the disciplines involved still maintain their autonomy. Masini (2000) refers to interdisciplinarity as a "parallel analysis" of the issue under investigation (p. 120).

Other researchers suggest that differing from multi-disciplinary research, interdisciplinary approaches to research may call into question the assumptions of the disciplines involved in the project; therefore, new assumptions may emerge as a result of the collaboration (Austin et al. 2008). In this respect, Austin and colleagues view the core of interdisciplinary research as *emergence*—"emergence," they write, "of new concepts, problems, or solutions being supported by a synthesis of diverse perspectives" (2008, 560). Similarly, Flinterman and colleagues note that "concepts, methodologies, or epistemologies are explicitly exchanged and integrated, resulting in a mutual enrichment" (2001, 257). Differing from his contention that multi-disciplinary research represents an "associative" relationship among the disciplines involved, McDonell

(2000) suggests that in interdisciplinary research the relationship is "relational" and the collaboration involves each discipline taking on some of the assumptions of the others (p. 27). Further, interdisciplinary work involves the creation of "a shared methodological approach" which crosses disciplinary boundaries (Wickson et al. 2006, 1050). However, even researchers who suggest that interdisciplinarity promotes exchange and emergence may still concede that disciplines and their guiding approaches are left intact, even if combined. For example, Wickson and colleagues note that interdisciplinarity "involves developing a common framework within which distinct epistemological approaches are used to investigate different themes or aspects of a research problem" (2006, 1050). Within this framework methods may be transferred from one discipline to another (Pohl et al. 2007). Returning to our bullying example we can see this at play:

- The Psychologist and Sociologist may come together in order to brainstorm about their approach to the topic. Upon learning of the relevant theories and methods of the other discipline, the two may develop a shared framework, such as a psychosocial approach to bullying. Such an approach may consider the psychological profile of the bullied in relation to a range of factors within their peer culture as well as the dynamics between the bullied, bully and peers (bystanders) within the school environment. Applying this framework, the researchers may build a mixed-methods design (perhaps using questionnaires and interviews), collect the data and engage in a shared analysis and interpretation process resulting in a co-authored article or series of co-authored or individually authored articles. (This would be the "best" or most integrative version of interdisciplinarity.)

Not only are there different philosophical perspectives on interdisciplinarity—the promise and perils—there is also clearly a range of applications of interdisciplinarity. In other words, there is a continuum on which interdisciplinary research can be placed with respect to key issues such as interaction, integration, synergy and emergence.

Space constraints do not allow for an in-depth discussion of this issue; however, I would like to put forth some suggested criteria for evaluating the intensity of interdisciplinarity in a project which may be useful when judging the extent to which various research projects engage with the possibilities of interdisciplinarity. First, I again suggest that the appropriateness of "degrees of interdisciplinarity," if you will,

should be based on the particulars of any given research project; there is no one way to be interdisciplinary.

Flinterman and colleagues suggest that "degrees of interdisciplinarity" result from the "degree of exchange and integration and the differences in the paradigms between the disciplines involved" (2001, 257). The issues of exchange and integration are sometimes difficult to evaluate but will be reviewed throughout this book. The distance between paradigms, however, is much clearer. For example, a project concerning several disciplines operating from a positivist point of view may not be considered highly interdisciplinary because the values, assumptions and methodologies guiding the research process are reinforced by each discipline, not challenged and changed. This may be a perfectly appropriate arrangement for a particular project—the point is not to rank the merit of various collaborations, but simply to note the differences among these kinds of collaborations and the "level" of interdisciplinarity. By these criteria the bullying example in which both researchers came from the social sciences and developed a shared but ultimately social scientific framework may not be considered highly interdisciplinary.

Nissani (1995) suggests that the four criteria for understanding the level of interdisciplinarity in a project should be: 1) the number of disciplines involved, 2) the distance between the disciplines involved, 3) the novelty and creativity in combining disciplinary elements, and 4) the degree of integration.

Now of course when put into practice this is all very complex. For example, a project may have a great number of highly diverse disciplines participating, but there may be little integration; therefore, the project may in fact meet the requirements of traditional multi-disciplinary research far more than interdisciplinary. Likewise, in such a project, some disciplines may have their values, assumptions, and methodologies more highly valued by the research partners than some others. In this instance there may be very little creativity or integration. Moreover, what does it mean to claim various disciplines are involved in a project if one world view (or paradigm) dominates the project? There is an issue of power that permeates all research collaborations: the power of individuals involved to shape and guide the process and/or outcomes as well as the power of disciplines and their dominant paradigms to dominate the process and/or outcomes (Austin et al. 2008). This is just one example of how complicated "evaluating" interdisciplinarity is when applied to actual research contexts. I should also note that many proponents of transdisciplinary

approaches to research suggest that the fourth criterion, integration, has not been realized in interdisciplinary efforts and it is only at the point of integration that transdisciplinarity emerges (see Austin et al. 2008). Nevertheless, Nissani provides a useful framework for thinking about the issues on which research claiming to be interdisciplinary can vary greatly. It is not surprising that, as reviewed, philosophical perspectives on what constitutes interdisciplinarity, and how it differs from multi-disciplinarity, vary widely.

With respect to research topics and questions, topics that are likely to be investigated are not discipline-based like in multi-disciplinary research but rather "occupy space between existing disciplines" (McMichael 2000, 203). Russell and colleagues suggest that interdisciplinary research generally focuses on "areas of overlap or intersection between disciplines" (2008, 460). As many topical areas are of interest to researchers in multiple disciplines (for example, bullying is of interest to sociologists, psychologists, social workers, and education researchers), similarly to multi-disciplinarity, interdisciplinary collaborations may involve the asking of essentially traditional research questions but from more than one perspective.

Before moving into a discussion of transdisciplinarity, the heart of this undertaking, it is important to mention that the relationship between interdisciplinarity and disciplinarity is a contested area in the literature, and one that I believe has lead to the emergence of a rapidly growing community of proponents of transdisciplinarity. Many on the frontlines of transdisciplinary approaches to research suggest that even interdisciplinary collaborations presuppose disciplines and therefore do not challenge the disciplinary organization of knowledge (Abbott 2001; Greckhamer et al. 2008). Some go further to suggest that interdisciplinarity actually serves to "further strengthen and reproduce disciplinarity" (Greckhamer et al. 2008, 324). Derrida (1997) suggests that interdisciplinarity actually confirms disciplinarity (despite the fears initially surrounding moves towards interdisciplinarity in academia). Drawing on Derrida (1997), Greckhamer and colleagues (2008) explain that interdisciplinarity is enabled through the existence of disciplines; therefore, that which makes interdisciplinarity possible also makes it, in its pure form, impossible. For some, transdisciplinarity represents a way to overcome this paradox and *transcend* disciplinarity.

Transdisciplinarity

It is important to acknowledge that multi-disciplinarity and interdisciplinarity have contributed enormously to moving the research community forward by getting disciplines to think about how they are related to each other and to start working together on issues of import. Moreover, these two approaches to research have implicitly exposed the limitations of disciplinarity. Nevertheless, these approaches can only go and have only gone so far. Some researchers argue that multi-disciplinary and interdisciplinary approaches to research have an additive quality (Ismail 2000) and fail to integrate and synthesize disciplinary knowledges. Transdisciplinarity has emerged in order to meet the promise of transcending disciplinary knowledge production in order to more effectively address real-world issues and problems. In this vein many suggest that interdisciplinarity turns into transdisciplinarity in a given project via transcendence and deep levels of collaboration (see for example Austin et al. 2008; Depres, Brais & Avellan 2004; Flinterman et al. 2001; Giri 2002; Klein 2004; Ramadier 2004) or via a participatory approach (ProClim 1997).

The origins of the term "transdisciplinary" can be traced to the early 1970s and the first international conference on interdisciplinarity (Klein et al. 2001). Jean Piaget and Erich Jantsch each pioneered the theoretical conceptualization of transdisciplinarity. The concept of transdisciplinarity is attributed to Piaget, who believed that "the maturation of general structures and fundamental patterns of thought across fields would lead to a general theory of systems or structures" (Klein 2004, 515). Jantsch is also credited as one of the first proponents of transdisciplinarity. He defined transdisciplinarity as "the co-ordination of all disciplines and interdisciplines in the education innovation system on the basis of a generalized axiomatics (introduced from the purposive level down) and an emerging epistemological ('synepistemic') pattern" (Jantsch 1972, 106). Put more simply, Jantsch saw transdisciplinarity as a means of addressing a social or human purpose, and he "envisioned a multi-level systematic coordination of research, innovation, and education" (Klein 2004, 515). Although definitions of the term vary enormously, following Piaget and Jantsch transdisciplinarity is generally understood as an approach to research that involves the integration of multiple disciplines in a project aimed at a social, human or "life-world" purpose.[1] It is also clear that transdisciplinarity grew out of interdisciplinarity or is a particular thread of interdisciplinarity (which will be discussed in chapter 2)

(see for example Austin et al. 2008; Depres et al. 2004; Flinterman et al. 2001; Giri 2002; Klein 2004; Ramadier 2004).

In essence, transdisciplinarity presupposes that contemporary social/human issues and problems can only be understood and solved if viewed holistically and not artificially broken down into narrow research purposes that suit different disciplinary lenses. Herbert Simon, 1978 Nobel Prize recipient in Economic Science, expresses this well.

> To understand budget decisions, one has to understand decision making in general.... It is necessary to study... the process of human thinking. To study thinking, I had to abandon my home discipline of political science and economics... for the alien shores of psychology, and a little later, of computer science and artificial intelligence." (1992, 265)

Many researchers suggest that transdisciplinarity is not a method for doing research or an outcome of research but rather an *approach* to the research process (Lawrence & Depres 2004; Klein 2004) or a "new way of thinking" (Giri 2002, 103). In this regard, Mittelstrass asserts that even though theoretical work may emerge from transdisciplinary research, transdisciplinarity is a "research principle" first and foremost (1996, 329). There is much debate in the literature about what the term transdisciplinary means and what constitutes transdisciplinary research. Although I will present various definitions of the term prior to presenting my own broad view I should note from the outset that I find any sort of definition problematic for three primary reasons.

First, definitions always represent a form of closure, and I think researchers should be free to label their work as they see fit; those who read their work can of course judge it as they see fit and determine how useful it is or isn't to them.

Second, the literature explicitly on transdisciplinarity has emerged disproportionately in a few fields and on a few topics (medicine, environmental studies/sustainability), and therefore there are inherent biases (points of view) that are more strongly represented than others. In this book I adopt the point of view of a researcher coming from the social sciences.

Third, the literature on transdisciplinarity is relatively new and thus, as an emerging field, there is a flurry of ongoing debate and negotiation taking place. Sometimes this kind of debate prompts folks to take very strong positions, to set forth rigid frameworks that may work for their current research but that do not necessarily work for everyone and in every context.

All of this is an important part of moving the discussion forward, but in the interest of making this book useful to those in the social sciences, education and health studies who may be interested in engaging with transdisciplinarity, I think it is best to focus on some of the principles of transdisciplinarity without putting forth a definition that may be limiting. The fear associated with this is of course that people may think "anything goes"; however, as will be reviewed throughout this book regardless of what we call our research (i.e., "transdisciplinary") we are still obliged to create a methodologically sound research project (strategies for research design and evaluation are given in-depth treatment in chapters 3 through 6). With all of this said, I begin reviewing some definitions of transdisciplinarity as well as the main principles of transdisciplinarity that emerge consistently in the literature. Finally, in consideration of the "agreed upon" principles I present my own broad view of transdisciplinary research.

Definitions of Transdisciplinarity

Perspectives on transdisciplinarity vary greatly in the literature, and there is little consensus regarding how to define the term (as would be expected with an emergent and inherently diffuse approach to research).

Some scholars explain that beyond multiple disciplinary bodies coming together, researchers should partner with practitioners or other stakeholders outside of academia in their research in order to address "real-world" problems (for example see Burger & Kamber 2003; Haberli & Grossenbacher-Mansuy 1998; Klein 2001). In this regard, transdisciplinarity can be understood as an attempt to bridge the academic world and the needs of different social bodies to address real-world issues and problems (Hadorn et al. 2008; Hoffman-Riem, Biber-Klemm, Grossenbacher-Mansuy, Hadorn, Joye, Pohl, Wiesmann & Zemp 2008).

Some scholars provide general definitions of transdisciplinarity that call out the general character of such approaches. For example, Krimsky explains transdisciplinarity as "the transcendence of disciplines for addressing meta-questions; the intersection of two or more disciplines for explicating problems; and the combination of methods/techniques/theory for several disciplines in the framing or testing of a hypothesis" (2000, 111). Of course researchers can adapt these ideas to fit with their research project. For instance, instead of posing or testing a hypothesis (more often done in quantitative research), a researcher or team of researchers may be framing a research purpose with related research questions (more often done in qualitative research).

Many researchers suggest specific criteria that denote transdisciplinarity. Pohl and Hadorn provide a definition which is representative of many of the models that appear in the literature. They assert transdisciplinary research

> deals with problem fields in such a way that it can: a) grasp the complexity of problems, b) take into account the diversity of life-world and scientific perceptions of problems, c) link abstract and case-specific knowledge, and d) develop knowledge and practices that promote what is perceived to be the common good. (2008, 20)

Summing up the literature on transdisciplinarity, Hadorn and colleagues set forth a similar set of four criteria: "first the focus on life-world problems; second the transcending and integrating of disciplinary paradigms; third participatory research; and fourth the search for unity of knowledge beyond disciplines" (2008, 29). Hadorn and colleagues go on to explain, and I concur, that the first two criteria are widely agreed upon, with increasing debate and disagreement with respect to the third and fourth criteria.

As opposed to formulating a set of particular criteria, some scholars explain the tenets of transdisciplinarity in more general terms. For example, Klein characterizes transdisciplinarity as a "mode of thought and action" (2004, 24). She explains transdisciplinarity as "a process and a commitment to a way of knowing and a way of being" (2000, 216). Klein provides the following definition: "Transdisciplinary vision, which replaces reduction with a new principle of relativity, is transcultural, transnational, and encompasses ethics, spirituality, and creativity" (2004, 516).

Klein further suggests that transdisciplinarity is a fluid concept that can be defined as "a holistic vision; a particular method, concept or theory; a general attitude of openness and a capacity for collaboration; as well as an essential strategy for solving complex problems" (2000, 4).

Similarly to Klein's position that transdisciplinarity is a vision, Leroy has suggested transdisciplinarity is a "sensitizing concept" (Klein 2004). Other scholars talk about transdisciplinarity as "a field of relationships" (Giri 2002, 106). This is because a transdisciplinary orientation requires researchers to look at disciplines in relational terms, not oppositional terms, which may require exploring possible pathways of interaction and then creating those relationships among disciplines (Giri 2002).

Other researchers elucidate the tenets of transdisciplinarity by explaining the ways in which it moves beyond interdisciplinarity. For example, Austin and colleagues write:

> Transdisciplinary research occurs when the collaborative process is taken one step further, often spontaneously emerging from interdisciplinary research when discipline-transcending concepts, terminology, and methods evolve to create a higher level framework and a fundamental epistemological shift occurs (Giri 2002; Max-Neef 2005). This step requires mutual interpretation of disciplinary knowledge (Gibbons et al. 1994) and a coherent reconfiguration of the situation. (2008, 557)

Other researchers explain the inter-trans relationship differently. Depres and colleagues assert that even in transdisciplinary projects the research group (or I would suggest, the research resources, which may or may not involve experts from different disciplines) "always remain interdisciplinary by the very nature of disciplinary education, and the research itself, which, if transdisciplinary, implies the final knowledge is more than the sum of its disciplinary components" (Lawrence & Depres 2004, 400).

With respect to the example of bullying, a transdisciplinary approach is problem-centered, and thus disciplinary resources are brought in based on their relevance and deep collaboration is demanded. For example, the process may look like this:

- A team of psychologists, sociologists, educational researchers and policy researchers assemble and may partner with non-academic stakeholders such as school teachers, afterschool care program coordinators, PTO members, social workers and guidance counselors.
- The team spends ample time developing a research agenda: identifying key topics, building shared definitions and concepts, and developing a conceptual framework for the study that is not the property of any one discipline. The team then comes up with a research design aimed at addressing the varied dimensions of the topic, such as: the relationship between the bully, bullied and peer bystanders; the relationship between the bully, bullied and professional bystanders (such as teachers and school workers); the role of public policies in impacting teacher and other professional responses/reactions to bullying; how the structure of the peer culture promotes bullying; the role of cyberculture (such as social networking sites) and other technologies (such as cell phones with cameras) in bullying; how structured leisure time (such as group sports or games) versus independent "free time" impacts bullying; the roles of gender, class, race, ethnicity, religion and sexual orientation in bullying; and so forth.
- The team then creates a planned division of labor. The research design includes ample time for the team (subsets of the team or the entire team) to come together, share early findings, and renegotiate assumptions and practices.
- Research findings are presented in multiple and appropriate forms and venues with the goal of reaching different groups of relevant stakeholders in order to promote positive social change.

I now move into a discussion of the principles of transdisciplinarity that permeate the literature.

Principles of Transdisciplinarity

Regardless of particular definitions, transdisciplinarity always involves the collaboration of multiple disciplinary sets of knowledge (I suggest this may be multiple persons working on a project or an individual researcher working with multiple sets of disciplinary knowledge and tools). Transdisciplinarity aims to provide a holistic and synergistic approach to studying an issue or problem. Further, the key principles of transdisciplinarity also include transcendence, emergence, synthesis, integration, innovation and flexibility.

Transdisciplinarity is issue- or problem-generated, not discipline-driven (Krimsky 2000). Traditionally, a researcher's disciplinary training has driven topic selection and question generation. First and foremost, transdisciplinarity is a way of putting the research problem, topic, issue or question at the center of the research process irrespective of one's "home" discipline. The questions for a researcher become transformed from: "What is an acceptable research topic in my discipline, and how does my discipline view this topic?" to: "What issues in the real-world need to be addressed or what problems in the real-world need to be solved, and how can they be most fully addressed? What sets of disciplinary knowledge are useful in this instance, and how will my disciplinary training come to bear?" Transdisciplinarity as an approach has emerged as a way to address important topics and questions, solve real-world problems, and identify and address the needs of an increasingly complex global community.

Table 1.1 Principles of Transdisciplinarity

Principle	Practice
Issue- or Problem-Centered	Problem at center of research determines use of disciplinary resources and guides methodology
Holistic or Synergistic Research Approach	Problem considered holistically through an iterative research process which produces integrated knowledge
Transcendence	Researchers build conceptual frameworks that transcend disciplinary perspectives in order to effectively address the research problem
Emergence	Placing the problem at the center of research (transcending disciplinarity) cultivates the emergence of new conceptual and methodological frameworks
Innovation	Researchers build new conceptual, methodological and theoretical frameworks as needed
Flexibility	Iterative research process requires openness to new ideas and willingness to adapt to new insights

In order to address real-world issues or problems as fully as possible, transdisciplinary approaches to research are *holistic* (see for example Flinterman et al. 2001; Klein 2000; Leavy 2009; Messerli & Messerli 2008). In fact, some suggest that transdisciplinarity is a response to the demand for holistic approaches to knowledge generation (Flinterman et al. 2001). In a transdisciplinary research project the aim is to consider the issue or problem holistically. In this regard, researchers create definitions of key concepts and the like in a holistic manner. The bringing together of different bodies of knowledge, different sets of research tools, and perhaps a team of differently trained researchers (and at times practitioners and/or community members) is intended to occur in a holistic and *integrated* manner. Additionally, a holistic approach to the research process itself is endorsed. This means that all of the aspects of the research methodology

are connected and inform each other in an iterative process (Hesse-Biber & Leavy 2011) (explicated later in chapter 3 on research design). Finally, the outcome of this process is an integrated form of knowledge or a hybrid knowledge that is larger than the sum of the parts that went into creating it (Flinterman et al. 2001; Hadorn et al. 2008; Horlick-Jones & Sime 2004; Klein 2004; McDonell 2000; Newell 2000; Pohl et al. 2007). Flinterman and colleagues discuss the relationship between holism and the production of integrated knowledge as follows:

> Transdisciplinarity as a specific form of interdisciplinarity in which boundaries between and beyond disciplines are transcended and knowledge and perspectives from different scientific disciplines as well as nonscientific sources are integrated.... In transdisciplinary research, widely differing forms of knowledge are integrated to produce an overall integral knowledge. (2008, 257)

Related to the idea of a holistic framework and integrated knowledge, many transdisciplinary researchers talk about transdisciplinary approaches to research as *synergistic* (sometimes they write of *synergy*, *synthesis* or *unity of knowledge*) (for example see Hadorn et al. 2008; Klein 2000, 2004; Lawrence 2004; McMichael 2000; Newell 2000; Nicolescu 1996; Pohl et al. 2007).

The term *transcendence* (or transgression) consistently appears in the literature on transdisciplinarity (see for example Austin et al. 2008; Bruce et al. 2004; Depres et al. 2004; Lawrence et al. 2004; Flinterman et al. 2001; Giri 2002; Greckhamer et al. 2008; Hadorn et al. 2008; Hoffmann-Riem et al. 2007; Horlick-Jones et al. 2004; Jantsch 1972; Krimsky 2000; McDonell 2000; McMichael 2000; Newell 2000; Nicolescu 1996; Pohl et al. 2007; Russell et al. 2008; Steinmetz 2007). Transdisciplinary approaches to research help researchers to transcend the limitations of disciplinary forms of knowledge-building, organization and dissemination. Because information, data, theories, and methodologies from multiple disciplinary viewpoints are brought into the process, and are respected and combined in order to create something new that is irreducible to the disciplinary components that initially were brought to bear, transdisciplinarity goes beyond disciplines. This is a feature which distinguishes transdisciplinary approaches from multi-disciplinary and interdisciplinary approaches. This is not to imply that individual researchers are able to completely disavow the assumptions, values and "lenses" of their disciplinary training; however, it does suggest that they

can move beyond them by creating conceptual frameworks that transcend particular disciplines (Greckhamer et al. 2008).

Related to transcendence, or perhaps enabled by it, the concept of *emergence* is also an important principle of transdisciplinarity (see for example Austin et al. 2008; Jantsch 1972; Klein 2004; Steinmetz 2007). McMichael connects the idea of emergence to the implications of the prefix "trans" by beginning with a discussion of the word "transport" as

> a process of moving something across an intervening space, we now inhabit new boundaries; we move to a different plane.... Poets talk of "transports of delight"—our mind, our spirit, is transported to some new, exhilarating, romantic plane of experience. The idea of transportation accommodates this extra notion of an emergent experience, an emergent property. (2000, 204)

Emergence refers to more than one aspect of transdisciplinary research. First, the bringing in of multiple disciplinary perspectives and tools will allow a new approach to research to emerge. In other words, a conceptual and methodological framework for carrying out the research will be built; one that is different and larger than the sum of its parts. Second, new insights may emerge as a result of the research process; insights that would not have come forth without a transdisciplinary process. The idea of emergence speaks to the part of research practice that is unplanned, when unexpected pathways come into view, and when new insights are unearthed. In this regard, because transdisciplinary research projects are combining different bodies of knowledge and different methodological tools in service of addressing research topics holistically, one never knows what one will discover. Drawing on hybridity theory (discussed in chapter 2) some propose that transdisciplinarity creates a "third space" (Bhabba 1994) or "intermediate space" (Steinmetz 2007) that only emerges when disciplinary borders are crossed, eroded, and transcended (for example, see Steinmetz 2007). Drawing on Brandao (2007) Cameron and Mengler explain this as follows:

> Rather than "bridging" boundaries, transdisciplinarity denotes the transgression of boundaries, defining a space in between.... Transdisciplinarity is a system with no stable frontiers between disciplines, the concepts of order and disorder, the known and the unknown, rationality and imagination, conscious and unconscious, and the formal and informal. (2009, 194)

Similarly, Depres and colleagues (2004) suggest that transdisciplinarity creates a "mediation space" between disciplines in which all of the phases of research are played out, including the definition of problems, epistemological positions, concept selection, the development of a research strategy, the combining of research methods, and the development of theoretical frameworks.

Transdisciplinarity also necessitates *innovation* (Lawrence 2004; Van Manen 2001; Wickson et al. 2006). Researchers are building new conceptual structures, methodological frameworks, theoretical frameworks and strategies for evaluation. Because these projects are always issue- or problem-driven, those needs supersede disciplinary norms. All of this requires innovation which is linked to *flexibility*. When many different perspectives, sources of data and methodological tools are combined in new ways as each project demands, researchers must be flexible, open to new ideas, and willing to revise the conceptual and methodological framework as the process warrants. The research process is iterative, and so new insights may emerge and prompt changes throughout the process (this is reviewed in chapter 3).

Table 1.2 A Comparison of Multi-Disciplinarity, Interdisciplinarity and Transdisciplinarity

	Level of Collaboration between Disciplines
Multi-Disciplinarity	Collaboration between two or more disciplines without integration
Interdisciplinarity	Collaboration between two or more disciplines with varying levels of integration of concepts, theories, methods and findings
Transdisciplinarity	Collaboration between two or more disciplines with high levels of integration causing the development of new conceptual, theoretical and methodological frameworks

Disciplinarity and Transdisciplinarity: A Love-Hate Relationship

> *The quest for international security requires that each nation unconditionally surrenders some fraction of its liberty of action, of its sovereignty.*
>
> —Albert Einstein to Sigmund Freud (1932)

I think the biggest questions for many who are introduced to the idea of transdisciplinarity are: What about disciplines and disciplinary training? What is the relationship between disciplines and transdisciplinarity?

The questioning of disciplinary structures is scary and even threatening to many. The reasons for this are not difficult to understand. Wallerstein (2000) suggests that in the social sciences, for example, when disciplines were formed it became necessary to justify and maintain the boundaries (also see Greckhamer et al. 2008). Establishing boundaries is how professionals build their identities and claim their turf. It is important to bear in mind, however, that the development of university departments is the result of the institutionalization of knowledge-building—a process based on the distribution of rewards and resources and not necessarily "ideas." This is elaborated in the next chapter through the example of the institutionalization of Communications departments and again returned to in chapter 6 in a larger discussion of the academic career structure—the interconnected promotion, publication and funding systems.

Multi-disciplinary and interdisciplinary approaches to research leave the disciplinary production of knowledge intact. Transdisciplinarity, however, does provide an epistemological challenge to disciplinarity (Klein 2000, 2004; Newell 2000; Wickson et al. 2006). Nevertheless, while transdisciplinarity points to the limitations of disciplinary modes of knowledge production, it still relies on them. In other words, *the growth in transdisciplinarity does not mean the abandonment of disciplines.*

While it is true that some claim transdisciplinarity has the capability to make disciplines irrelevant (and as noted earlier, I think researchers should be free to view transdisciplinarity in different ways), most scholars suggest, and I concur, that a firm grounding in one's "home" discipline or disciplines is a vital asset in transdisciplinary research projects. In this regard, Giri writes: "Transdisciplinarity calls for an art of authentic embeddedness in one's discipline and transcendence does not mean cutting off from the ground where one stands but widening one's

horizons.... There is a transdisciplinary undercurrent within each of our disciplines" (2002, 108). Klein (1990) similarly explains, and I strongly agree, that transdisciplinarity makes disciplines "instrumental to the larger framework" (Greckhamer et al. 2008, 313).

I propose that transdisciplinary researchers have to give up the idea that their disciplinary values and assumptions are "the truth" and instead become hyper-aware of their disciplinary lenses and then combine those perspectives with others, without privileging one way of looking at the issue over another. In this way, we can best serve our research agendas by drawing on the resources in our own disciplines as well as other relevant disciplines. The more important the research questions become in the contemporary world, the more we must commit ourselves to prioritizing answering them with all available tools.

In the beginning of this chapter I wrote: *Transdisciplinary research practices are issue- or problem-centered approaches to research that prioritize the problem at the center of research over discipline-specific concerns, theories or methods.* In order to elaborate on that rudimentary definition I suggest the following one as a broad, open and non-exclusive working understanding of transdisciplinarity: *Transdisciplinarity is a social justice oriented approach to research in which resources and expertise from multiple disciplines are integrated in order to holistically address a real-world issue or problem. Transdisciplinarity draws on knowledge from disciplines relevant to particular research issues or problems while ultimately transcending disciplinary borders and building a synergistic conceptual and methodological framework that is irreducible to the sum of its constituent parts. Transdisciplinarity views knowledge-building and dissemination as a holistic process and requires innovation and flexibility.*

With a working understanding of transdisciplinarity and how it differs from disciplinary, multi-disciplinary and interdisciplinary approaches to research, I move into a discussion of the academic and social context in which transdisciplinarity has emerged and in which it has become necessary.