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DISCIPLINING INTERDISCIPLINARITY: The Case for Textbooks

by

Allen F. Repko

University of Texas at Arlington

Abstract. This essay makes the case for the disciplining of interdisciplinarity through the vehicle of textbooks. It draws upon (1) the 2003 Delphi survey of interdisciplinarians regarding opportunities and challenges to interdisciplinary education, (2) research in cognitive psychology and education about the nature of learning, and (3) the emerging conversations regarding definitions of interdisciplinary studies, theoretical underpinnings of the professional literature and practice, and the various step-based approaches to operationalizing the interdisciplinary research process.

A history of the field of interdisciplinary studies will undoubtedly recognize the significance of the year 2005 as the inaugural year for textbook development in interdisciplinary studies with the publication of two college-level textbooks. Tanya Augsburg's *Becoming Interdisciplinary: An Introduction to Interdisciplinary Studies* is suited for introductory courses, and my text, *The Interdisciplinary Process: A Student Guide to Research and Writing* (a preliminary edition), is geared toward advanced undergraduate and graduate students.¹ The publication of these textbooks marks a coming-of-age for this maturing field now some three decades old with its solid body of foundational theoretical work and its arrival in the mainstream classroom. On hearing that Augsburg's textbook had been written, one reviewer admitted to "mixed feelings" ranging from excitement to worry (Castellana, 2005, p. 1). The worry was over what textbooks, especially first textbooks, tend to do: demarcate a territory with their attendant inclusions and exclusions. "Texts," rightly observes Richard Castellana, "are necessarily selective and, especially in the social sciences and humanities, seem to leave out what one thinks should be included and make what is still controversial seem definitive. This is an especially sensitive issue for first texts as students will perceive them as

defining the field" (p. 1). "Defining the field" is what some interdisciplinarians are anxious to avoid. These textbooks, and others that may follow, are certain to add another chapter to the ongoing conversation about the best approaches to interdisciplinary teaching and knowledge formation. Given the progress of the field, and the controversy over whether interdisciplinary studies should be an exercise of fission (i.e., conflict) or fusion (i.e., consensus), the discussion of concrete examples of fusion—the textbook—is timely.

The purpose of this essay is to make the case for developing textbooks either as core readings or as supplemental readings in interdisciplinary studies courses at all levels. This case rests on three propositions. First, a Delphi survey of prominent interdisciplinarians published in 2003 strongly urges the development of textbooks. Second, research in cognitive psychology about the nature of learning and research in education about active learning supports the use of textbooks as learning aids. Third, the field is ripe for the coordination that a textbook can provide regarding the definitions of interdisciplinary studies, the theory justifying interdisciplinarity, and the various step-based approaches to operationalizing the interdisciplinary research process.

The Delphi Study

The case for developing interdisciplinary studies textbooks receives strong support from prominent interdisciplinarians participating in a Delphi study. James Welch IV (2003), who conducted the study, posed this question to them: "What changes in interdisciplinary studies programs need to take place over the next decade in order to better serve the needs of students whose academic goals are not adequately addressed by traditional discipline-based programs?" (p. 170) The participants responded by addressing five key areas: curriculum, teaching methods, faculty development, administration, and program delivery.

Under "curriculum," participants achieved consensus on the need for textbooks, citing the following reasons:

1. Students need "an overview of various disciplinary perspectives and methodologies."
2. Students need "a section providing basic integrational methods along with concrete examples."
3. Students at the lower divisional levels "are more dependent upon textbooks to provide structure to their learning process."
4. "There is a general need for more textbooks focusing upon interdisciplinary studies which are accessible to classroom instructors" (p. 185).

The consensus on these points suggests concern about students actually *doing* interdisciplinary research and the need for textbooks that explain how to operationalize interdisciplinarity.

The following discussion examines how, and to what extent, the kind of textbook(s) envisioned by the participants can satisfy each of these arguments.² The discussion also addresses concerns raised by some Delphi participants—and others in the field—that textbooks risk “standardizing interdisciplinary education” (p. 185).

1. Students need “an overview of various disciplinary perspectives and methodologies.”

This first argument for textbooks assumes, correctly so, that textbooks are the most effective vehicle for efficiently delivering foundational disciplinary information that is captured by the phrase “disciplinary perspective.” A disciplinary perspective is a discipline’s view of that portion of reality that it considers within its research domain. Over time, a discipline and its perspective produce theories, and theories, in turn, produce insights into a problem of interest to the discipline (Repko, 2005, pp. 45–48). These insights along with the discipline’s assumptions, concepts, theories, methods, and epistemological preferences constitute the defining elements of a discipline that the Delphi participants say undergraduate students should know and be able to easily access when researching a problem. Gathering this widely dispersed information often proves a daunting and time-consuming task to students. A textbook, however, can mitigate this burden by providing students with these basic disciplinary elements. Such information will help students figure out which scholarly sources and experts to turn to in order to determine which disciplines to mine for insights. Less time spent on figuring out the perspectives (broadly defined) of particular disciplines means more time available for active learning in such areas as how to apply close reading techniques, how to identify conflicting insights and the sources of those conflicts, how to create common ground among them and thereby integrate them, and how to produce an interdisciplinary understanding of the problem or question.

A textbook would be particularly helpful to advanced students needing information on epistemological approaches. Epistemology, of course, underpins all of the basic elements of a discipline (Becher & Trowler, 2001, p. 23; Calhoun, 2002, p. 145). The disciplines in the social sciences and in the humanities, more so than in the natural sciences, are characterized by epistemological pluralism (Becher & Trowler, p. 38). For example, reflecting

the growing criticism of positivism’s empiricism and value neutrality,

most social scientists now agree that knowledge [in their disciplines] is generated by the continual interplay of personal experience, values, theories, hypotheses, and logical models, as well as empirical evidence generated by a variety of methodological approaches, from ethnography to statistical analysis. (Calhoun, p. 373)

Given epistemological fragmentation in the human sciences (the social sciences and the humanities), it is almost impossible to associate a particular epistemology with a particular discipline.

The interdisciplinary teacher should be interested in epistemology for at least two reasons. First, good interdisciplinary work requires a strong degree of epistemological self-reflexivity (Klein, 1996, p. 214). Interdisciplinary work should be aware of the advantages and disadvantages of their favored epistemological approach, as well as the advantages and disadvantages of other approaches with which they are perhaps less familiar. Second, teachers and researchers should be aware that their epistemological choices tend to influence their selection of research methods that, in turn, influence research outcomes (Bell, 1998, p. 101). According to James A. Bell, most scholars tend to fall into one of two epistemological camps. There are the followers of the “law and order” approach to epistemology that points to any flexibility in matters epistemological as a guise for relativism or at least a mask for being weak or lacking conviction in expressing one’s views. Then there are those who view epistemology as “totally arbitrary, being nothing more than a political power game to legitimize one’s favored views” (p. 103). This latter conception, says Bell, is at the heart of numerous “postmodernist” and “hermeneutic” approaches that typically operate under the assumption that there is no such thing as objective truth, or at least no objective truth available to humans: “Instead, knowledge is explained socio-politically, usually as a weapon in the hands of some individuals or groups to dominate and intimidate others” (p. 103). A textbook can efficiently survey the major epistemological positions and discuss their strengths and limitations. It can also demonstrate that interdisciplinarians are wise to recognize that taking extreme positions on the epistemological issue is harmful because it limits one’s own thinking and denigrates the thinking of others.

Given the fundamental importance of epistemology to the disciplines, and thus to interdisciplinary inquiry, students should be exposed to the major epistemological approaches as early as possible. And since students will inevitably encounter various epistemologies in the course of gathering

disciplinary information on the problem at hand, the question arises as to the best way to accomplish this result. At least four options come to mind: (a) provide this information in the form of lectures (which cognitive science research has proven ineffective compared to other approaches to learning), (b) require students to read reserve materials on epistemological approaches, (c) require students to ferret out this knowledge on their own, or (d) refer students to a textbook containing the information. This last option makes the most efficient use of students' time. A textbook can show how epistemology relates to the other basic elements of disciplines, explain why this knowledge is of interest to interdisciplinarians, and provide examples of how epistemological information is used in interdisciplinary research and writing.

The Delphi study's first argument for textbooks also singled out various disciplinary "methodologies" as something that students should know, and for good reason. "Since methodological choices greatly influence outcomes," writes Bell, "using method as a tool ... can greatly increase flexibility in pursuing new discoveries and perspectives ... [and] each method will have advantages and disadvantages, depending on the task" (1998, pp. 100-101). As Rick Szostak (2004) points out, disciplinary and interdisciplinary programs approach methods differently. "Disciplinary programs, whether undergraduate or graduate, tend to devote considerable effort to a discussion of the method or methods favored by the relevant discipline ... [but] almost never juxtapose the methods of the humanities with those of other sciences." Interdisciplinary programs, on the other hand, "tend toward a broad, though not exhaustive, coverage of methods" (p. 101).

Familiarity with the major methods of disciplinary research is no less fundamental to conducting interdisciplinary research than is familiarity with epistemological positions. But as with epistemology, the same question arises as to how best to introduce methodological approaches to students without either devoting an inordinate amount of class time to presenting them or placing the burden of obtaining this often hard-to-find knowledge entirely on students. Textbooks of the kind envisaged by the Delphi participants that draw from both disciplinary and interdisciplinary sources are ideal for delivering this information because they can provide examples of how various disciplinary methods and theories are appropriate to a range of interdisciplinary problems.

2. Students need "a section providing basic integrational methods along with concrete examples."

It so happens that the Delphi study's first justification for textbooks, just

discussed, addresses what William H. Newell (2001), in part "A" of his model of the interdisciplinary research process, calls "drawing on disciplinary perspectives" (p. 15). Part "B" of his model, "integrating their insights through construction of a more comprehensive perspective," corresponds to the study's second justification for a textbook, namely, "a section providing basic integrational methods along with concrete examples." It is this linking of textbooks to the integrative part of the interdisciplinary process that we now consider.

Newell based his initial model of the interdisciplinary process (not shown) on the "idealized" model developed by Julie Thompson Klein (1990) in *Interdisciplinarity: History, Theory, and Practice* as shown in Table 1 (pp. 188-189).³

Table 1

THE INTEGRATIVE PROCESS	
<i>KLEIN</i> ^{3,4}	
1a.	<i>Defining</i> the problem [question, topic, issue];
b.	<i>Determining</i> all knowledge needs, including appropriate disciplinary representatives and consultants, as well as relevant models, traditions, and literatures;
c.	<i>Developing</i> an integrative framework and appropriate questions to be investigated;
2a.	<i>Specifying</i> particular studies to be undertaken;
b.	<i>Engaging</i> in "role negotiation" (in teamwork);
c.	<i>Gathering</i> all current knowledge and <i>searching</i> for new information;
d.	<i>Resolving</i> disciplinary conflicts by working toward a common vocabulary (and focusing on reciprocal learning in teamwork);
e.	<i>Building</i> and maintaining communication through integrative techniques;
3a.	<i>Collating</i> all contributions and <i>evaluating</i> their adequacy, relevancy, and adaptability;
b.	<i>Integrating</i> the individual pieces to determine a pattern of mutual relatedness and relevancy;
c.	<i>Confirming or disconfirming</i> the proposed solution [answer]; and
d.	<i>Deciding</i> about future management or disposition of the task/project/patient/curriculum.

³(Klein, 1990, pp. 188-189)

Subsequently, Newell (2007) has modified his original model by splitting a two-part step (*gathering* all current disciplinary knowledge and *searching* for new information) into two separate steps (*gathering* disciplinary knowledge and *identifying* non-linear linkages) and shifting the latter step from part A to part B, making 14 steps (p. 4), as shown in Table 2.

Table 2

THE STEPS IN THE INTERDISCIPLINARY RESEARCH PROCESS	
NEWELL (2007 Version)*	
A. DRAWING ON DISCIPLINARY PERSPECTIVES	
1.	Defining the problem (question, topic, issue);
2.	Determining relevant disciplines (including interdisciplines and schools of thought);
3.	Developing a working command of relevant concepts, theories, methods of each discipline;
4.	Gathering all relevant disciplinary knowledge;
5.	Studying the problem from the perspective of each discipline; and
6.	Generating disciplinary insights into the problem.
B. INTEGRATING THEIR INSIGHTS THROUGH CONSTRUCTION OF A MORE COMPREHENSIVE UNDERSTANDING	
7.	Identifying conflicts in insights by using disciplines to illuminate each other's assumptions, or by looking for different concepts with common meanings or concepts with different meanings, through which those insights are expressed;
8.	Evaluating assumptions and concepts in the context of the specific problem;
9.	Resolving conflicts by working towards a common vocabulary and set of assumptions;
10.	Creating common ground;
11.	Identifying (non-linear) linkages between variables studied by different disciplines;
12.	Constructing a new understanding of the problem;
13.	Producing a model (metaphor, theme) that captures the new understanding; and
14.	Testing the understanding by attempting to solve the problem.

*(Newell, 2007, p. 248)

In reality, the Klein and Newell (revised) models have much in common, differing in a few minor respects: Newell has 14 steps to Klein's 12 steps; Newell divides the entire process into "A" and "B" parts; and Klein gears her approach more to interdisciplinary group research than does Newell (note Klein's steps 1b, 2e, and 3d in Table 1).

After the publication of Newell's original 13-step model (now 14 steps) in 2001, another model was published. Rick Szostak (2002), in "How to Do Interdisciplinarity: Integrating the Debate," introduces a 12-step model, shown in Table 3, that generally follows Newell's (pp. 103-122).

Table 3

HOW TO DO INTERDISCIPLINARITY	
SZOSTAK*	
1.	Start with an interdisciplinary question.
2.	Identify the key phenomena involved, but also subsidiary phenomena.
3.	Ascertain what theories and methods are particularly relevant to the question at hand. As with phenomena, be careful not to casually ignore theories and methods that may shed some lesser light on the question.
4.	Perform a detailed literature survey.
5.	Identify relevant disciplines and disciplinary perspectives.
6.	If some relevant phenomena (or links among these), theories, or methods identified in (2) and (3) have received little or no attention in the literature, the researcher should try to perform or encourage the performance of such research.
7.	Evaluate results of previous research.
8.	Compare and contrast results from previous disciplinary or interdisciplinary research.
9.	Develop a more comprehensive/integrative analysis.
10.	Reflect on the results of integration.
11.	Test the results of integration.
12.	Communicate the results.

*(Szostak, 2002, pp. 105-119)

Szostak wants the interdisciplinary process as he describes it in his model to "be seen as a guideline for the community of scholars as a whole," but adds this caveat: "The individual researcher and many teams of researchers will generally only be able to perform *some subset of these steps in any detail*" (italics added, p. 105).

This caveat points up the central problem with all three models of the interdisciplinary process shown in these tables: their complexity. Perhaps this is why instructors at Harvard University adopted a much simpler four-part "strategy" used to promote integrative thinking in two undergraduate seminars. As reported by Svetlana Nikitina (2002) in "Navigating the Disciplinary 'Fault Lines' in Science and in the Classroom: Undergraduate Neuroscience Classroom in Mind, Brain, and Behavior at Harvard," their model consisted of four simple steps:

1. Learn the Discipline(s).
2. Identify Points of Connection or Disconnection.
3. Describe Limits of the Discipline.
4. Attempt a Synthesis (pp. 35-41).

One contribution that a textbook can make to students and instructors is to integrate the steps and their ordering that the Klein, Newell, and Szostak models have in common. These models and their steps are correlated as closely as possible in Table 4.

Table 4

CORRELATION OF MODELS OF THE INTERDISCIPLINARY PROCESS		
KLEIN	NEWELL (2007 Version)	SZOSTAK
1. <i>Defining</i> the problem [question, topic, issue] (1a)	1. <i>Defining</i> the problem (question, topic, issue) (1)	1. Start with an interdisciplinary question (1)
2. <i>Determining</i> all knowledge needs, including appropriate disciplinary representatives and consultants, as well as relevant models, traditions, and literatures (1b)	2. <i>Determining</i> relevant disciplines (including interdisciplines and schools of thought) (2)	2. Identify key phenomena involved but also subsidiary phenomena (2)
2b. <i>Developing</i> an integrative framework and appropriate questions to be investigated (1c)	2b.	2b. Identify relevant disciplines and disciplinary perspectives (5)
3. <i>Specifying</i> particular studies to be undertaken (2a)	3. <i>Developing</i> a working command of relevant concepts, theories, methods of each discipline (3)	3. Ascertain what theories and methods are particularly relevant to the question at hand. As with phenomena, be careful not to casually ignore theories and methods that may shed some lesser light on the question (3)
4. <i>Gathering</i> all current knowledge and <i>searching</i> for new information (2c)	4. <i>Gathering</i> all relevant disciplinary knowledge (4)	4. Perform a detailed literature survey (4)
5a. <i>Collating</i> all contributions and <i>evaluating</i> their adequacy, relevancy, and adaptability (3a)	5a. <i>Studying</i> the problem from the perspective of each discipline (5)	5a. If some relevant phenomena (or links among these), theories, or methods identified in (2) and (3) have received little or no attention in the literature, the researcher should try to perform or encourage the performance of such research (6)
5b.	5b. <i>Generating</i> disciplinary insights into the problem (6)	5b.

Table 4 (cont.)

CORRELATION OF MODELS OF THE INTERDISCIPLINARY PROCESS		
KLEIN	NEWELL (2007 Version)	SZOSTAK
6.	6. <i>Identifying</i> conflicts in insights by using disciplines to illuminate each other's assumptions, or by looking for different concepts with common meanings or concepts with different meanings, through which those insights are expressed (7)	6. Compare and contrast results from previous disciplinary or interdisciplinary research (8)
7. <i>Collating</i> all contributions and <i>evaluating</i> their adequacy, relevancy, and adaptability (3a)	7. <i>Evaluating</i> assumptions and concepts in the context of the specific problem (8)	7. Evaluate results of previous research (7)
8. <i>Resolving</i> disciplinary conflicts by working toward a common vocabulary (and focusing on reciprocal learning in teamwork) (2d)	8. <i>Resolving</i> conflicts by working toward a common vocabulary and set of assumptions (9)	8.
9.	9. <i>Creating</i> common ground (10)	9.
10.	10. <i>Identifying</i> (non-linear) linkages between variables studied by different disciplines (11)	10.
1. <i>Integrating</i> the individual pieces to determine a pattern of mutual relatedness and relevancy (3b)	11. <i>Constructing</i> a new understanding of the problem (12)	11. Develop a more comprehensive/integrative analysis (9)
12.	12. <i>Producing</i> model (metaphor, theme) that captures the new understanding (13)	12. Reflect on results of integration (10)
13. <i>Confirming or disconfirming</i> the proposed solution [answer] (3c)	13. <i>Testing</i> the understanding by attempting to solve the problem (14)	13. Test the results of integration (11)
14.	14.	14. Communicate the results (12)

The steps used in these three models point up two realities that must be addressed by any textbook on interdisciplinary studies, especially one

that is consensus-oriented and geared toward advanced undergraduate and graduate students. The first reality is that models disagree on the number, order, and identity of steps, leaving students and instructors alike without a clear roadmap of the overall interdisciplinary process. Of special concern is the lack of consensus on how many steps are involved in the integrative portion of the interdisciplinary process (Newell’s steps 7-12), which, after all, is its hallmark. This lack of consensus and clarity on steps that deal explicitly with integration further complicates an already complicated research process. So, when the Delphi participants recommend that students be provided “basic integrational methods,” the question arises as to which model and/or which particular steps within these models do the study’s participants have in mind?

The second reality, however, is that these models agree on several steps. As noted earlier, *a textbook should not be definitive about what is clearly controversial, but should reflect scholarly consensus*. Comparison of these approaches reveals that consensus exists on the following steps:

- The problem or question must be defined (Klein’s 1a, Newell’s step 1, Szostak’s step 1).
- Relevant disciplines and other resources must be identified (Klein’s 1b, Newell’s step 2, Szostak’s steps 2 and 5).
- Adequacy in each relevant discipline must be achieved (Klein 2a, Newell’s step 3, Szostak’s step 3),
- Information from these disciplines (concepts, theories, methods, etc.) must be gathered (Klein’s 2c, Newell’s step 4, Szostak’s step 4).
- The problem must be studied and insights into the problem must be generated (Klein’s 3a, Newell’s step 5 and 6, Szostak’s step 6).
- Conflicts between disciplinary insights must be identified (Newell’s step 7, Szostak’s step 8).
- Disciplinary insights must be evaluated and resolved, and common ground must be created or discovered (Klein’s 3a and 2d, Newell’s steps 8, 9, and 10, and Szostak’s step 7).
- Integration must occur and an interdisciplinary understanding produced (Klein’s 3b, Newell’s step 12, Szostak’s step 9).
- The new understanding must be tested by applying it to the problem, issue, or question (Klein’s 3c, Newell’s step 14, Szostak’s step 11). [Note: the author omits this step in his 2005 textbook.]

Steps on which consensus exists (with the exception of step 2) appear in this author’s 2005 textbook (in which steps 9 and 10 are conflated) and in *Interdisciplinary Research: Process and Theory* (forthcoming) as follows:

Table 5

AN INTEGRATED APPROACH TO THE INTERDISCIPLINARY RESEARCH PROCESS	
<i>REPKO*</i>	
A. DRAWING ON DISCIPLINARY INSIGHTS	
1.	Define the problem or formulate the focus question
2.	Justify using an interdisciplinary approach
3.	Identify relevant disciplines
4.	Conduct a literature search
5.	Develop adequacy in each relevant discipline
6.	Analyze the problem and evaluate each insight into it
B. INTEGRATING INSIGHTS AND PRODUCING AN INTERDISCIPLINARY UNDERSTANDING	
7.	Identify conflicts between insights and their sources
8.	Create or discover common ground
9.	Integrate insights
10.	Produce an interdisciplinary understanding of the problem and test it

*(Repko, forthcoming)

Significantly, all three models and my proposed synthesis emphasize the non-linearity of the interdisciplinary process, meaning that along the way students should reflect on and may need to revisit, or even revise, earlier work. Most importantly, the model draws on the work of Veronica Boix Mansilla and Howard Gardner that calls for using the integrated result to propose a new policy, produce a new product (e.g., aesthetic or commercial), pose a new question, or promote further research.

In addition to textbook writers providing discussion of “basic integrational methods,” Delphi participants also want them to include “concrete examples” of how these are used. By “concrete examples” of integrative work, participants appear to mean a problem approached from two or more disciplinary perspectives with their insights seamlessly and *explicitly* integrated into a more comprehensive understanding of the problem that would be impossible using a traditional disciplinary or even multidisciplinary approach. Students, especially advanced students, need to see examples of how interdisciplinary scholarship is put together. The problem with so much

interdisciplinary work is that the process used is not explicit and, therefore, is almost impossible for students to deconstruct. A case in point is William Dietrich's (1995) *Northwest Passage: The Great Columbia River*. It is interdisciplinary in that it integrates insights from multiple disciplines, but the interdisciplinarity is *implicit* in that Dietrich fails to identify the particular disciplines, theories, or insights he is using in his narrative.

While there is an abundance of scholarship about interdisciplinary studies in all of its aspects, more examples are needed of explicitly interdisciplinary work that addresses real world problems and intellectual questions. Fortunately, some interdisciplinary programs are making available online their outstanding senior-level research or capstone projects: as Miami University's Western College Program has done (<http://www.lib.muohio.edu/theses/>); through interlibrary loan as Truman State University has done; and by responding to requests as the faculty at the University of Texas at Arlington are doing. It is hoped that other interdisciplinary programs will make their exemplary student research projects available to the larger community.

Of particular importance to advanced students and instructors of advanced courses are examples of various integrative techniques drawn from professional and student work that a textbook can provide. By using a combination of published and exemplary student work from the natural sciences, the social sciences, and the humanities, a textbook can walk students through the entire interdisciplinary process. These examples can illustrate many, though certainly not all, of the possible steps found in the models noted earlier.

Indeed, no exemplary student work from any interdisciplinary program reflects *all* of the possible steps that Klein, Newell, Szostak, and Repko urge. The rapidly growing body of professional and student work illustrates the great variety of problems suitable to interdisciplinary inquiry, the profitable use of disciplinary methods as part of an overall interdisciplinary research process, the appropriate use of disciplinary theories, the insightful application of integrative techniques, the creative use of metaphors, and the richness of the new understandings and meanings. In short, this variegated body of research should counter the concern that consensus on some aspects of the research process will lead to a linear and formulaic approach to interdisciplinary work.

3. *"Students at the lower divisional levels ... are more dependent upon textbooks to provide structure to their learning process."*

The Delphi study's third argument for textbooks is supported by a Zogby

International survey conducted in December 2004 of 1,029 college faculty members, the vast majority of whom (817) teach at four-year institutions. The study was sponsored by the Association of American Publishers (not a disinterested third party by any means). The survey found that fully 84% of college professors believe that students absolutely need a textbook to successfully complete their classes ("College Professors Overwhelmingly Favor New Texts," 2005, p. 1). This result is tempered, however, by a survey of Syracuse University professors, some of whom cautioned that the need for a textbook is not universal but often depends on the level of the class, noting that problems can arise when the textbooks are too general for the class. Examples of the value of textbooks include statements by two history professors at the university who acknowledged the need for a textbook to provide a general overview of their courses. Said one, "In intro classes it's helpful. It gives students a framework for material they don't know much about" (Pauer, 2005, p. 1). The professor also noted that textbooks expand on what is taught in class. Robert Smith, professor of bioengineering and neuroscience and director of the Institute for Sensory Research, agrees with the need for textbooks, particularly in difficult technical courses (p. 2). Though these are surveys of people's perceptions, they nevertheless reflect the academy's belief that textbooks are a valuable aid to teaching and learning.

4. *"There is a general need for more textbooks focusing on interdisciplinary studies which are accessible to classroom instructors."*

The Zogby survey, the Syracuse interviews, and research by cognitive psychologists and educators (discussed below) support the fourth reason advanced by the Delphi participants for interdisciplinary studies textbooks: "There is a general need for more textbooks focusing on interdisciplinary studies which are accessible to classroom instructors" (Welch IV, 2003, p. 185). In a word, instructors need them. Admittedly, this perceived need may have less to do with concerns about student learning and more to do with faculty wanting to be more efficient. This said, interdisciplinary instructors and students need resources as much as do instructors and students of any discipline. Indeed, one can argue that interdisciplinary instructors and students need textbooks even more than do instructors and students of many disciplines given the unusual demands of the interdisciplinary research process. A daunting challenge faced by instructors and students new to interdisciplinary studies is acquiring basic information about

disciplines with which they are unfamiliar. Once again, a textbook is ideal for bringing together a wide array of information relevant to all aspects of the interdisciplinary process.

Concerns Voiced by Delphi Participants

Alongside the arguments supportive of textbooks, the Delphi study notes that some practitioners are concerned that the development of a textbook “runs the risk ... of standardizing interdisciplinary education” (Welch IV, p. 185). However, merely reflecting scholarly consensus on some aspects of the interdisciplinary research process does not constitute standardization of the entire process. The challenge to textbook writers is to walk a fine line between fusion (consensus) and fission (controversy).

Interdisciplinary studies students, no less than their disciplinary counterparts, should be conversant with the major controversies within the field. One of these controversies concerns the fundamental nature of the interdisciplinary research process, which is the issue that J. Lynn Mackey (2002) raises in “Rules Are Not the Way to Do Interdisciplinarity: A Response to Szostak.” By extension, Mackey’s criticism applies to all step-based models, including my integrative attempt. Mackey speaks for those interdisciplinarians who view the concept of consensus as problematic to interdisciplinarity, who resist any attempt to “discipline” the field, or who object to any model that attempts to define the interdisciplinary research process in any detail.

Mackey’s first argument against a step-based or rule-based conception of the interdisciplinary process is that Szostak’s steps or rules fail to mirror his own research experience and that “only some of [Szostak’s] steps seem to apply” (p. 124). In fact, the only step of the 12 that Mackey embraces fully is Szostak’s first step. It is also Klein’s and Newell’s first step and, not surprisingly, the first step of almost every disciplinary research method.

Mackey’s second and primary argument against step-based or rule-based models is that they make little or no room for “emergence.” Emergence, according to Mackey, has much in common with intuition and spontaneity, and, therefore, it would be hard to capture how this occurs in a given situation by steps or rules. Mackey’s conception of the interdisciplinary process is that it should have little to do with steps and rules. In fact, Mackey even predicts that emergence will displace integration (pp. 125-126). The practical problem facing textbook writers, however, is that while the literature includes a growing number of step-based examples of professional and exemplary student work

from which to draw, examples of Mackey’s “emergence” approach applied to a variety of topics and objects spanning the natural sciences, the social sciences, and the humanities are extremely rare.

A second and related controversy concerns the postmodern critique of integration. This critique advances three claims: (a) there are no universal standards by which scholarship can be judged; (b) there is no unique scientific method that allows confidence to be placed in truth claims; and (c) theorizing should be viewed skeptically and carried out only at a very local level (Szostak, 2005, pp. 21-27). Postmodernists doubt that theories are able to accommodate diverse points of view (Rosenau, 1992, p. 82) and believe that any theory is necessarily incomplete because each theorist stands in a different context and sees different things (Rosetti, 2001, p. 319). As applied to integration on the local level, postmodernists are suspicious of any linear and step-like approach or method leading toward it. They are also critical of attempts to model the interdisciplinary research process grandly on complexity theory as proposed by Newell (2001), preferring instead that interdisciplinarity be modeled on chaos theory (Mackey, 2001, pp 59-70). This theory, rather than complexity theory, appeals to postmodernists for two reasons according to Mackey: (a) it supports the notion of “the incremental nature of scholarship,” and (b) it favors “an iterative [or repetitive], nonlinear mechanism to produce the complex fractal structure of knowledge” (pp. 68-69). For postmodernists such as Abbott (2001), there exists “no abrupt demarcation ... between disciplinary and interdisciplinary scholarship” (p. 230) because “both involve the scholar addressing incremental issues” (Mackey, 2001, p. 69).

Postmodernists are also suspicious of attempts to synthesize interdisciplinary studies. As has been demonstrated in other fields that appreciate and use integration, such as women’s studies, African-American studies, and criminology, there is a recognition that synthetic consensus produces an integrative framework, but that different integrationists will themselves synthesize the field differently, thus producing competing interdisciplinary frameworks. In their textbook on criminology, Einstadter and Henry (1995) express this concern with respect to integration of theories in their chapter “Fission or Fusion.” They argue that integrated theory

can result not so much in a solution to the problems of diversity [of theoretical approaches] but to an intensification of the problem. Since each integration theorist may use different criteria to construct his or her own comprehensive approach, what emerges is integrational

chaos. So what starts out as a recognition that there are competing theoretical perspectives in criminology, ends up in a battle for who has the best collection of theories in [his/her] integrated framework. ... The plain fact is that integrated theorizing does not lead to a more comprehensive understanding of crime or criminal etiology. (p. 309)

Fortunately, Einstadter and Henry do not end on this gloomy note. Comparing theory to a toolbox with each of the criminology theories representing different tools, they suggest an alternative to the fusion model whereby the integration criterion shifts to a fission model that questions which theory, or parts of the theory, can be used to best explain and solve the problem. Retaining the individual integrity of theories whose differences and applications are refined and specialized may be more important than developing the grand explanatory tool (p. 310).

The debate on what level of integration is appropriate to the field of interdisciplinary studies returns us to the theme of the fusion versus fission approach to textbook writing. If placed on a continuum with fusion on one end and fission on the other, the ideal would be a mixed consensus/conflict approach that maintains the theoretical and methodological tension in the field. This approach would still allow the author(s) to present a coherent synthesis of the field while discussing, when appropriate, conflicting views and approaches. Textbooks that present a step-based approach to the interdisciplinary research process should, then, address the concerns and objections of those who, like Mackey, do not want to see the interdisciplinary “commons” fenced in by steps and rules. For introductory students, a textbook can at least acknowledge this tension and other important controversies and discuss the strengths and weaknesses of each position. Textbooks for more advanced students can probe these controversies more deeply but not allow them to overshadow the textbook’s primary mission of explicating the complex interdisciplinary research process.

The Complementarity of Textbooks with Newer Theories of Learning and Pedagogical Approaches *Research in Cognitive Psychology and Education*

Research in cognitive psychology and education supports the Delphi participants’ call for the development of textbooks on how to do interdisciplinary research. In recent decades, cognitive psychology research has taught us a great deal about how students learn. Students learn

by making cognitive connections, social connections, and experiential connections. Students construct knowledge based on what they have learned previously in life experience rather than by merely absorbing knowledge typically disseminated through lectures (Cross, 1998). Students learn better when working together (Annis, 1983) and when dealing with a compelling problem (Ewell, 1997). Combined, these understandings have given rise to a new paradigm in higher education that shifts the focus on teaching to a focus on learning or cognition (Barr and Tagg, 1995; Bass, 2005, p. 99) and the development of new, innovative pedagogies that include project-based learning, inquiry-based learning, research-based learning, situation-based learning, action learning, and problem-based learning (PBL).

PBL, an approach common to interdisciplinary studies courses, uses complex problems that serve as the context and stimulus for learning. Students in PBL classes tend to work in teams to solve compelling problems. “They develop skills in collecting, evaluating, and synthesizing resources as they first define, and then propose a solution to a multi-faceted problem” (Major & Palmer, 2001, p. 1). Research on PBL effectiveness compared to traditional instruction that features a teacher-centered classroom and the lecture method shows that PBL helps students develop advanced cognitive abilities such as critical thinking, problem-solving, and communication skills (Barr & Tagg, 1995).

A PBL format often changes the way instructors and students see and use a textbook. A textbook may be unnecessary for an advanced course built around problems in which students need to access multiple primary sources. But, as White has commented, “for a course that uses a PBL format only part of the time to emphasize certain concepts during class time, a textbook is an important reference” (2001, p. 73). Research also shows that PBL and related pedagogies produce two kinds of student behaviors that relate to their mode of studying and their use of materials. In their mode of studying, PBL students tend to be more versatile than are non-PBL students. In their use of materials, PBL students are more inclined to use reserve materials than are non-PBL students (Nolte et al., 1988), and they are more likely to use textbooks and other publications than are non-PBL students who are more likely to rely on lecture notes (Blumberg & Michael, 1992).

According to research by cognitive psychologists, textbooks bring several advantages to student learning at all levels. For one thing, they greatly enhance the student’s ability to store and retrieve information. Textbooks are usually designed according to an organizational schema involving chronology, hierarchy, and categories that foster meaningful relationships

among the data (Britton et al., 1993). Moreover, effective use of chapter titles and subheadings guides the acquisition and retention of important concepts (Bransford & Johnson, 1972). More fundamentally, however, textbooks enhance comprehension of vital relationships. The authors of most textbooks provide background information on the history and development of the field about which they are writing, including its important theories, methods, and other basic elements. A well-written text can offer links that enhance students' ability to retrieve information from memory storage (Craik and Watkins, 1973), and can point out relationships between important concepts in a way that strengthens the memory trace and facilitates greater recall or recognition (Craik & Lockhart, 1972; Jacoby & Craik, 1979; Lockhart, Craik & Jacoby, 1976).⁵ Furthermore, a textbook reduces the occurrence of source confusion. Research also shows that attributions to the wrong source may lead to memory failures (Gardiner & Java, 1991; Rajaram, 1993).⁶ Finally, noted psychologist Wilbert J. McKeachie (2002) writes, "While professors like to think that students learn from the professor, it seems likely that students often learn more efficiently from reading than from listening" (p. 181).⁷ He sees the vast array of printed materials as important as the technological revolution, noting that "textbooks are still a basic tool for teaching most courses" (p. 14).

Indeed, there are disadvantages to not using a textbook. Without a textbook, the task of integration, which should be a major focus of any interdisciplinary course, may prove so overwhelming to some students that greater pressure is placed on instructors to provide instruction on how integration is achieved. Also, if the instructor spends time doing what a textbook can do more efficiently, less class time is available for problem solving, applications, and other purposes. But with a textbook, instructors "can rely on the students to obtain the basic content and structure of the subject matter through reading and thus be freer to vary procedures in the classroom" (McKeachie, pp. 12-13).

The extensive research by cognitive psychology on the benefits that textbooks bring to the learning experience is supported by educational research on active learning. In Bonwell and Eison's (1991) widely quoted definition, active learning involves students "doing things and thinking about the things they are doing" (p. 2). Meyers and Jones (1993) take this definition one step further by identifying what students are to actually do in an active learning classroom setting, namely, "to meaningfully talk and listen, write, *read*, and reflect on the context, ideas, issues, and concerns of an academic subject [*italics added*]" (p. 6). They see textbooks and other printed sources as elements critical to active learning strategies. The problem

is not with these materials, they argue, but with the failure of professors to effectively integrate them in an active classroom setting. Their chapter "Integrating Reading Materials and Guest Speakers" offers numerous practical suggestions to help students connect what they are reading to the classroom activities (pp. 123-133).

The complementarity of textbooks with active learning strategies is supported by other active learning theorists. For Nist and Holschuh (2000), "Texts are crucial to learning in college," with 85% of all college learning involving text interaction (p. 47).⁸ Rather than reducing or eliminating the need for textbooks and supplemental readings, active learning theorists argue for making more effective use of these traditional media. For example, Bean (1996) finds that carefully designed active learning strategies enable students to read textbooks more purposefully and interact more critically with supplemental readings (p. 9). Active learning exercises may include having students write their own textbook-based multiple-choice quiz questions, write about the course to explain why the textbook is difficult to understand, or reflect on how the textbook supports or challenges their own views on the topic under discussion (pp. 106, 146). Bean finds that when active learning techniques include textbook reading, "students often become more interested in scholarly works," especially when they "realize that every writer necessarily distorts his or her subject" and that no textbook or scholarly work can provide all that they need to know on a given subject (p. 140). Weimer (2002), another authority on effective college teaching, argues from a constructivist perspective that knowledge cannot simply be given to students: Students must construct their own meanings. In this process, the textbook can play an important role provided that active learning techniques are creatively applied to it. Weimer offers several examples of this. The instructor can ask students: "Give me an example to illustrate this concept. Maybe it's something from your experience or something that you read in the textbook that might illustrate this concept" (p. 80). Also, the instructor can ask students to keep an "open-ended, exploratory log" where they can reflect on whatever catches their interest during the course: content, something in the textbook, insights as they work on assignments, and reactions to other students (p. 98).

How Sociocultural Theory Informs Our Understanding of Textbook Usage

Missing from the foregoing discussion is how sociocultural theory informs our understanding of textbook usage. Sociocultural theory is an umbrella

descriptor that refers to activity theory, situated cognition, situated learning, and sociocultural or cultural historical theories. These theories have their intellectual origins in the sociocultural school of psychology developed by Lev Vygotsky who argued that to understand the individual, one must first understand the social context in which the individual exists. Sociocultural theories, explains Lisa Lattuca (2005), contrast “with behavioral and cognitive models that portray learning as an individual activity and as an artifact that can be easily separated from the contexts in which it takes place” (p. 16). Sociocultural theory and activity theory conceptualize human behavior and cognition as being “embedded in collectively organized, artifact-mediated systems.” These, she says, are the cultural tools and signs that allow us to communicate with one another, and include “the texts that we read and the languages we use to express ourselves” (p. 19).⁹ Accordingly, a textbook is but one of many “mediating artifacts” available to educators and, understood in this way, can be used in the same way that one uses any other mediating artifact in the teaching and learning process.

The Compatibility of Textbooks with Interdisciplinary Learning and Teaching

Cognitive psychology and the literature on active learning are silent as to whether and how textbooks can be profitably used in an explicitly interdisciplinary classroom. This silence extends to the extensive literature on innovations in interdisciplinary learning and teaching, with rare exceptions such as the notation of Christopher Myers and Carolyn Haynes (2002): “Transforming a [interdisciplinary science] classroom *from one centered on lectures, textbooks, and objective tests to one focused on interdisciplinary inquiry is not an easy process [italics added]*” (p. 181). They describe an interdisciplinary learner-centered paradigm as one in which “students construct knowledge through gathering and synthesizing information from a variety of disciplines and integrate that information with the general skills of inquiry, communication, and general reflection” (pp. 181-182). In this conception of an inquiry-based pedagogical “process,” the role of textbooks as convenient sources of relevant information is marginalized. But some interdisciplinary programs that are using the new teaching and learning paradigm are also profitably using textbooks in their introductory and advanced courses, demonstrating that students can construct knowledge by gathering and synthesizing information from a variety of sources, including textbooks, and produce good interdisciplinary work in the process.¹⁰

Interdisciplinarians wanting to embrace the new paradigm, then, need not feel that they must choose between the new theory and old media, between active learning and textbooks. True, interdisciplinary studies fosters change in higher education and innovation in the classroom. But change and innovation need not result in abandoning textbooks. Indeed, research from cognitive psychology and education shows that textbooks, rather than hindering learning, can be used effectively to enhance learning when used in conjunction with the new pedagogical approaches. As Haynes (2002) reminds us, interdisciplinary pedagogy is not synonymous with a single process, set of skills, method, or technique (p. xvi). Since this is so, interdisciplinarians should at least consider textbooks as an optional teaching and learning tool. Granted, some interdisciplinarians are reluctant to consider textbooks because they view them as a step toward defining the field. But by using the newer active learning techniques, interdisciplinarians can provide students with the several benefits afforded by a textbook while mitigating the perceived negatives of this medium. Textbooks are an important part of a college instructor’s compendium of tools, and the newer teaching methods and aids supplement rather than supplant their use.

Indeed, textbooks are particularly appropriate for use in interdisciplinary studies courses at all levels because they illustrate a discourse and provide a perspective. A textbook, whether it serves as a core reading or as a supplement to other materials, provides a scholarly lens through which students can see the field. To fully accomplish what Klein calls “the active triangulation of depth, breadth, and synthesis,” the learner should be exposed to all viewpoints. Textbooks can also facilitate the process of integration (McKeatchie, 2002, p. 182). Students in interdisciplinary courses, despite the valiant efforts of instructors to render assistance, often struggle to connect and integrate the course information into a meaningful whole. One reason for student frustration is the amount of time required to do interdisciplinary research. The tendency is for students to spend considerable time on the first and foundational task of developing adequacy in the relevant disciplines, often leaving insufficient time for the most important and intellectually demanding task of the interdisciplinary process of actually integrating insights and producing an interdisciplinary understanding. Most interdisciplinary faculty have disciplinary terminal degrees and little familiarity with the defining elements of disciplines other than their own, yet they want to advance integrative learning with their students. Students and faculty would find a textbook useful that explains the integrative process and illustrates this process using examples drawn from professional and exemplary student

work. A textbook can help bring balance to the competing demands for disciplinary depth, breadth, and integration required in interdisciplinary teaching, research, and writing.

The Philosophy and Method of Textbook Writing

This discussion is contextualized around such issues as the type of textbook to write, the range of what is covered and how it is covered, and how the two textbooks emerging in interdisciplinary studies compare to the kinds of disciplinary textbooks that are available. A fundamental difference in textbooks is whether they are written by a single author or co-produced by several authors. Each approach brings something unique to the project. The single author textbook is more likely to reflect the writer's personal understanding of the field (as reflected in the choice of themes threaded throughout the narrative) than is the multiple-author textbook. For example, the author of a popular "introduction to sociology" textbook makes clear his preference for a traditional approach to the field by omitting from his discussion of theory any reference to postmodernist theory as greatly impacting the discipline (Newman, 2004). A textbook co-produced by two or more authors must balance between making the chapters look and sound the same or letting each author have her/his own voice (Campbell & Smith, 1997, p. xiii).

Another concern has to do with the range of *what* a textbook covers and *how* it covers the material. Many variations exist within disciplines when it comes to baseline understanding. This variation is all the more problematic within interdisciplinary studies because the field has only just reached the point where there is sufficient potential for scholarly consensus on its principles. Consequently, textbooks should point the reader toward the literature which provides a scholarly rationale for each principle in addition to explaining the principle itself. In a sense, then, the kinds of textbooks that the Delphi participants are urging are those aimed at faculty who teach interdisciplinary courses as much as at students who take these courses.

More particularly, the author(s) must decide whether the textbook is to cover the whole field of interdisciplinary studies, as would be done for an introductory survey course, or to focus more narrowly on some aspect of the field, say, the interdisciplinary research process, as would be appropriate for a course on interdisciplinary research or other advanced courses. If the whole field is covered, does the textbook author present a summary, identifying what is common and then synthesizing those elements, or describe particular

positions within the field virtually as an ethnographer would. The dilemma facing textbook writers is whether to embrace either the fusion model that reflects consensus or the fission model that reflects differences. Some might adopt a mixed consensus/conflict approach that would maintain the dialectical tension in the field.¹¹

Closely related to the issue of range is that of audience. Within the range of approaches, these two recent textbooks offer alternatives: The broad-ranging Augsburg textbook offers an introduction to the field for beginning students; my 2005 textbook is designed for advanced undergraduate and graduate students doing interdisciplinary research.

Synthesizing and Disseminating the Interdisciplinary Research Process

Textbooks for either introductory or advanced students would not have been possible a few years ago. For one thing, definitions of interdisciplinary studies had not been sufficiently operationalized. As late as 1997, the young field had only an emerging consensus definition: "Interdisciplinary studies may be defined as a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline or profession. . . . IDS draws on disciplinary perspectives and integrates their insights through the construction of a more comprehensive perspective" (Klein & Newell, 1997, pp. 393-394). But no process for conducting interdisciplinary research had yet achieved consensus.

Several major scholarly events have made the development of textbooks possible. The first was the publication in 1990 of Julie Thompson Klein's watershed book *Interdisciplinarity: History, Theory, and Practice*. More than any treatment, it gave the field definition, and it gave a common identity to those engaged in interdisciplinary work. Klein also provides a masterful synthesis and bibliography of the substantial body of interdisciplinary literature, thus documenting how interdisciplinary research is forming its own academic subculture.

In 1996, Klein published her landmark study *Crossing Boundaries: Knowledge, Disciplinarity, and Interdisciplinarity* in which she investigates the myriad interactions and reorganizations that disciplinary boundary crossing creates, and explains how these are central to the production and organization of knowledge. Her book, with its exhaustive bibliography, remains the most comprehensive and rigorous critique

of the ways disciplinary boundaries inhibit knowledge production and interdisciplinary integration.

Two years later, William H. Newell published the monumental anthology of interdisciplinary scholarship *Interdisciplinarity: Essays from the Literature*. If one wants to write a textbook, one must be thoroughly familiar with the rapidly growing body of interdisciplinary scholarship, beginning with this anthology. Of particular value to textbook writers is Newell's concluding essay, "Professionalizing Interdisciplinarity: Literature Review and Research Agenda," upon which many classroom instructors have since relied.

Another major publishing event was the appearance in *Issues in Integrative Studies* (2001) of Newell's "A Theory of Interdisciplinary Studies," along with responses from five prominent interdisciplinary scholars. Newell advances the claim that interdisciplinary study is mandated by complexity and, in effect, that "complex systems and phenomena are a necessary condition for interdisciplinary studies" and that "an interdisciplinary approach is justified only by a complex system" (p. 1). The requirement of complexity, though controversial, at least moves the conversation away from definitional issues to operational ones. Newell's complexity theory also links the field more directly to the new pedagogy of PBL and similar pedagogies discussed earlier.

In that same essay, Newell also proposes generic "steps" in the interdisciplinary research process to address that complexity. These "steps," as noted earlier, are already being vetted within the professional literature as evidenced by my synthesis and explication of them, and the earlier development of an interdisciplinary studies assessment instrument by Wolfe and Haynes (2003, pp. 126-169).

A fifth major publishing event occurred in 2007 with Newell's essay, "Decision-Making in Interdisciplinary Studies." In this essay, he presents an "idealized model" and a "theory-based strategy" for individual decision-making about any particularly complex issue (p. 2). Newell's agenda is fourfold: (a) to explain in greater detail the steps of the interdisciplinary process that he advanced in 2001; (b) to modify his earlier model by expanding the number of steps from 13 to 14 and changing their order (as discussed earlier); (c) to apply the complex systems framework to this step-based model because "it provides a rationale for best practice techniques that are widely accepted among interdisciplinarians"; and (d) to address postmodernist criticism of his step-based model. This he does by describing the interdisciplinary process, as he has defined it, as actually "a rationale and

procedure for doing precisely what these critics wish"—validating multiple perspectives that provide more comprehensive understandings of a problem or intellectual question. These understandings, he assures postmodernists, are not "grand, all-encompassing, stories" that "claim some kind of transcendent and universal truth" and that "miss the heterogeneity of human experience." Rather, these understandings are "small and local, temporary and tentative, and limited in time and space" (pp. 3-4). In other words, postmodernists can employ his step-based model without contradiction.

Together, these publications form the definitional, theoretical, and operational core of the field—or at least that portion of the field occupied by the Association for Integrative Studies. Textbooks can and must address and utilize these seminal publications, and, by doing so, "help establish the field academically and be an invaluable aid to instructors within it" (Welch IV, p. 185).

The case for textbooks on interdisciplinary studies is supported by the Delphi study, research in cognitive science, the development of powerful new problem-oriented pedagogies, and recent major publications in the field. The textbooks by Augsburg and Repko will be accepted and used to the extent that they reflect scholarly consensus on how to do interdisciplinary research and that they help students to become interdisciplinary learners.

Biographical note: Allen F. Repko is Professor of Interdisciplinary Studies and Director of the interdisciplinary studies program at the University of Texas at Arlington. He has designed its core curriculum and is developing an internship and service learning course. His research interests include the theory and practice of interdisciplinarity, curriculum design, pedagogy, assessment, and how the IDS research process can be applied to real world problems.

Notes

¹ Subsequently, Augsburg has published a second edition of her book in 2006. I have completed a new book, tentatively titled *Interdisciplinary Research: Process and Theory*, which will be published by SAGE Publications, Inc., in early 2008.

² For the purpose of this paper, "textbook" refers to a scholarly presentation of the principles of a discipline or subdiscipline upon which consensus has been reached and that is grounded in peer-reviewed scholarship. By contrast, the term "collection" refers to a gathering of new or mostly new writing, and the term "anthology" denotes a gathering of previously published, or mostly previously published, work (Germano, 2001, p. 121). As used in this essay, the term "textbook" does not include textbooks on critical thinking because these

do not address the concepts, theories, and methods distinctive to the field of interdisciplinary studies.

³ Klein (2005) offers a new “global model of an interdisciplinary approach to problem solving” that “moves beyond earlier models of a linear sequence of steps to acknowledging the messier realities of integration [that was] devised initially in the context of design, planning, and policymaking and then later generalized as a generic model of integration” (p. 42).

⁴ Klein’s steps also appear in Newell, W.H. (2001). *A Theory of Interdisciplinary Studies. Issues in Integrative Studies*, 19, 14.

⁵ Craik and Watkins (1973) wanted to demonstrate that it takes a specific type of rehearsal to move items from short-term memory into long-term storage. They found that rote memorization of isolated words or concepts does not allow for meaningful connections to be made that allow for efficient storage. They showed that rehearsal time does not deepen the memory of material; only deeper forms of processing can lead to multiple avenues for encoding the material in long-term memory. Craik and Lockhart (1972) argued that the concept of rehearsal alone is not sufficient to account for long-term memory. Rehearsal is a kind of processing, but it is not very deep. They believed that it is the “depth” of processing that demonstrates whether information is stored over a long rather than a short period. Craik and Lockhart defined “depth” in terms of a continuum: an example of shallow processing is writing a word in capital letters, whereas deep processing is placing that same word in a sentence (this involves semantic processing of a consideration of meaning). A key function of a textbook is to contextualize information, linking this information to other information, and illustrating these contexts and links with examples.

⁶ I am grateful to my colleague, Cindy Atha-Weldon, for her insights concerning this paragraph on research in cognitive psychology.

⁷ *McKeachie’s Teaching Tips*, now in its 11th edition, is the classic in the field. It is an invaluable resource for instructors interested in learning how to more effectively identify and use written materials, especially textbooks, and blend these learning tools with lectures and other teaching techniques. McKeachie is Professor Emeritus and former Chairman of the Department of Psychology at the University of Michigan, Research Scientist and past Director of the University of Michigan Center for Research on Learning and Teaching, and former President of the American Psychological Association and of the Association for Higher Education.

⁸ “Nist and Holschuh’s use of “text” is not limited to textbooks, but is a much broader notion of “text,” of which textbooks might be one instance.

⁹ As in the Nist and Holschuh quote, Lattuca’s use of “text” is not limited to textbooks, but refers to a much broader notion of “text,” of which textbooks might be one instance.

¹⁰ At the University of Texas at Arlington, for example, textbooks on interdisciplinary research methods are being used with great success in its core courses.

¹¹ This is not to say that there is a complete absence of controversy, but controversy is muted. See, for example, Dorsten & Hotchkiss (2005), Wiersma & Jurs (2005), Hagan (2006), Beins (2004), Dudley (2005), Manheim, Rich, Willnat, & Brians (2006), and Graziano & Raulin. (2004).

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