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Phone: 513-529-2659
Fax: 513-529-5849
E-mail: Phyllis Cox at coxpa@muohio.edu or Bill Newell at newellwh@muohio.edu

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The Fate of the Disciplines

Special issue argues they are 'hollowing out'

Review of *The Fate of the Disciplines*, James Chandler and Arnold J. Davidson, eds., *Critical Inquiry*, Summer 2009,Vol. 35, No. 4.

Reviewed by Beth A. Casey, Assoc. Prof. Emeritus, English, Bowling Green State University.

The Fate of the Disciplines is an informative and often brilliantly entertaining issue of *Critical Inquiry* that succeeds in arguing quite conclusively that were we to begin the university over again we would design a system different from the present structure. The volume is the third in a trilogy that presents, according to editor James Chandler, Director of the Franke Institute for the Humanities at the University of Chicago, "a sense of mismatch" in higher education between developing forms, practices, and communities of scholarship and the institutional arrangements that are supposed to advance them (CI, p. 731). Chandler is also the co-editor of two previous issues, the first, entitled "Questions of Evidence" (1992,) explores changing evidentiary protocols in contemporary scholarship (CI, p. 731), and the second, "Arts of Transmission" (2004), examines scholarly communication in a time of rapidly developing information technology. The first issue was inspired by Clifford Geertz's well-known article on the "blurring "of disciplinary genres and the manner in which disciplinary procedures of critical analysis had started to merge, forming an almost continuous field of interpretation (CI, p. 731). All three issues were generated by conferences sponsored by the Planck Institute. The conference on the fate of the disciplines was held in May of 2006 when the Institute simultaneously created a new Center for Disciplinary Innovation (CDI) offering graduate seminars taught by faculty from two disciplines that would in some way advance disciplinary transformation. Three other research universities (Berkeley, Cambridge, and Columbia) have now joined Chicago to form the Consortium for Disciplinary Innovation. (This

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Want to serve on Newell Award Committee?

Interested in serving on the Selection Committee for the Newell Award? This fall's ballot will include candidates for the Selection Committee, as well as for the AIS Board of Directors.

The Newell Award for Exemplary Service was established in 2009 to honor William H. Newell, founding President and longtime Executive Director of AIS. Recipients are individuals who have distinguished themselves by contributions that support and enhance the Association for Integrative Studies. Joan Fiscella, a past AIS president and former editor of *Issues in Integrative Studies*, was the first recipient in 2009.

In considering the selection process for the award at its mid-year meeting in March, the Board of Directors decided that the Newell Award Selection Committee should include the president as ex officio chair, a past recipient, and two members not currently on the Board who are elected by the general membership. The elected members will serve a term of two years.

If you would like to be considered for the Newell Award Selection Committee, you should notify Board President Karen Moranski, kmora1@uis.edu, of your interest by June 1, and answer the question: Why do you want to serve on the committee? ■■■

The Fate of the Disciplines ...

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complements the Consortium on Fostering Interdisciplinary Inquiry initiated at the University of Minnesota.)

While reading *The Fate of Disciplines*, I was continually reminded of *The Politics of Interdisciplinary Studies* (2009), edited by Tanya Augsburg and Stuart Henry, which contains essays replete with evidence of the hegemonic power and control of disciplinary departments, the frustrating tendency of interdisciplinary fields to "adopt the mantle" of traditional disciplines, and, simultaneously, evidence of the weakness or negligence of disciplines with their unexamined norms and casual structures, much as Bill Reading disclosed in *The University in Ruins* (1996). Authors of articles in this issue of *Critical Inqui*ry often confirm and amplify this weakened condition of the disciplines—a kind of "hollowing out"—perceiving a lack of innovation in them. Collegial collaboration is also most often found outside of them. They remain, however, the primary unit for hiring, tenure, and promotion, i.e., the locus of power; and scholars state, sometimes cynically, in these articles that they turn to their disciplines/departments most often for precisely these needs. Cogently, Chandler quotes a colleague who when asked how he felt about dual membership in two departments replied that it did not matter what discipline you identified with so long as you were properly ashamed of it. Chandler notes, almost apologetically, that a post-Foucauldian embarrassment about disciplines was prevalent at the time of his comment, but serious post-Foucauldian thought is present throughout this very contemporary volume (CI, 734), and the remark may have signaled a gap between past and present—the rigidly codified past and the interdisciplinary present.

The Fate of the Disciplines presents four significant reflections on disciplinarity itself, 10 case studies on disciplines—including at least one interdisciplinary study, and photographs from an art installation project that connect to the principle of integration in concepts, disciplines, and social groups. I will address them in this review in that order. All participants in the original conference on disciplines were asked to respond to the question: "What is a discipline?" Unfortunately, Chandler and Davidson might better have asked a different question if they wanted fresh illumination since the responses to the question are quite uniformly the ones both interdisciplinarians and disciplinarians commonly use, that is, a set of practices by which knowledge is acquired, confirmed, implemented, preserved and reproduced" (CI, p. 751). Disciplines seek to provide continuity over time for methods of identifying evidence, building arguments, providing investigative procedures, and maintaining boundaries. Scholars in this volume also acknowledge that disciplines contain radical contradictions in their modes of approaching these elements and often manifest little internal coherence. Not surprisingly, some authors note that disciplines also create an enigmatic sense of belief or *doxa,* which may contribute to a sense of belonging. Louis Menand in his recent study of the university as the marketplace of ideas quoted a 1989 survey that while 70% of the faculty felt loyalty to their discipline only 40% felt loyalty to their university or college (Menand, 2010, p. 122). I suspect that the latter figure would be lower today. Without care this detachment could tragically weaken the faculty's ability to respond to marketplace predators and the continuing raids on both disciplinary and interdisciplinary programs under the pressures of the current extraordinary crisis in state budgets.

The most significant general address in the volume concerning the weaknesses of disciplines involves an ebullient and witty discussion of the organization of knowledge in the university at large by Marshall Sahlin, Professor Emeritus of Anthropology at Chicago. In an article entitled "Conflicts of the Faculty" (echoing Kant and Derrida), Sahlin strikes out, randomly yet powerfully, in a searing condemnation of academic capitalism and the corporate structure of the university. He describes the impact of corporate power on the University of Chicago, whose faculty nevertheless did participate in bringing about the resignation of then President Sonnenschein in 1999. He concludes by arguing that the university's structures for knowledge are in need of reform if not revolution. Though he has no concrete proposals to offer, he has the wisdom to see that it is the hierarchy and the corporate structure of the university that deprived the faculty of their sovereign agency and encouraged them to "opt out of the collective life" of the academy in favor of loyalty to the self in the diminished space of achievement left to them. This leaves faculty with a curious paralysis in times of exigency with little inclination to undertake collective action to create new architectures. Instead they are inclined to accept their "fate," as indicated by the ominous title of this volume. In describing what he calls "our rather feckless system of intellectual production," he notes that the Division of Social Sciences at Chicago alone has seven disciplinary departments and 23 interdepartmental entities: centers, programs, institutes, studies or committees—a dizzying array (CI, p. 1015). (The Humanities have 17 departments and 33 such units.) Though he is not anti-interdisciplinary, he complains, in a vaguely formulated criticism of interdisciplinary centers or institutes, that they frequently often have paradigms without an object, like contemporary theory; or they may have objects without paradigms, like area studies (CI, p. 1017). This causes him to express relief that much interdisciplinarity is happening by diffusion without having to further institutionalize it thus adding to "a Byzantine web of interstitial academic entities" (CI, p. 1016). He finds, quite rightly, that many topics, concepts, methods and theories which invite interdisciplinarity are now widely circulating through the humanities and social science disciplines and frequently are then indigenized and hybridized (if not travestied!) as they are encompassed. Although he can find excellence in many areas, he concludes "all that clutters is not gold" (CI, p. 1017).

Interdisciplinarians reading this essay will recognize one of the frequent irritations in research institutions at the vast proliferation of interdisciplinary units that are similar to departments in their "silo effect." We see as well one reason for their frequent demise under financial constraints. James Chandler himself, who recognizes in his introduction that space is needed for the interdisciplinary, nevertheless asks what we are to do with all the new "studies," whether better integration of their contributions is desirable, at what point are they to be considered disciplines, and, finally, is there some better way to organize the university besides departments and proliferating centers, institutes, or programs (CI, p. 738).

In *The Politics of Interdisciplinary Studies*, Augsburg and Henry quote Cindi Katz on the need to rework and radically rethink the organization of knowledge production in the university and thus "alter the grounds of knowledge and the troubled and troubling structures that hold them in place" (p. 22). Throughout the volume interdisciplinary scholars and administrators note that interdisciplinary studies can be seen as complicit with the fragmentation of the university, that what is required is "structural integration," that we need to move from the periphery to the core and create, establish, and formalize interactions between and among scholars. Thus this very important book clearly re-enforces the fundamental need expressed by scholars in *The Fate of the Disciplines* to reinvent and reimagine the organization and production of knowledge.

The focus of the second general discussion of disciplinarity may come as a surprise—that is academic freedom—and the anxiety level is high. The subject is referenced frequently throughout the volume. A lively debate is presented between Robert Post, David Boies Professor of Law at Yale, and Judith Butler, Professor of Rhetoric and Comparative Literature at Berkeley, on the necessity for strong disciplines if there is to be academic freedom. Post demonstrates that he has done some research on interdisciplinarity (Julie T. Klein is quoted among others), and he understands the way in which interdisciplinarity responds to new knowledge needs. In fact, he expects that the transformation of knowledge practices largely brought about by interdisciplinarity will necessarily produce complementary changes in the internal organization of universities. (He believes the transformation will evolve—perhaps, fatalistically.) However, since interdisciplinarity implies for him a complementary dependence on disciplines, and since hiring practices still largely take place in disciplinary departments, the disciplines remain "over determined" for him to the point where he concludes that any autonomy that universities may claim from the control of external forces—in other words, their academic freedom—is based on professional knowledge which is identified in his mind with disciplinary knowledge. The law cannot safeguard, for example, "amateurs who wish to contribute to the political development of the nation" (CI, p. 770). Post is not out to attack "tenured radicals," but in our present political climate his legalistic view and anxieties are worthy of note and certainly provide one explanation for "disciplinary hegemony."

Judith Butler disagrees profoundly with Post and rises pointedly to the defense of contemporary knowledge practices in a manner especially noteworthy for interdiscipliarians and for humanists. She asks, pointedly, that if professional norms, construed in part as disciplinary norms, legitimate academic freedom, what if anything legitimates such norms (CI, p. 774)? We would be left with an illogical and indefensible situation. Any critical inquiry into the legitimacy of those norms would appear to threaten academic freedom and fall outside the compass of its protection, as would any work that threatened disciplinary boundaries (CI, p. 774). Further, if a certain kind of critical inquiry is being defended in academic disciplines, then how do we understand what that is or whether it is a purely disciplinary operation? Critical inquiry, she argues in her extensive essay, is grounded in a notion of critique that exceeds disciplinary domains and is a primary operation of reason prior to any disciplinary boundaries—transdisciplinary (CI, p. 781). Such reasoning empowers political dissent and formulates objections to illegitimate claims of public/governmental agencies. Our transdisciplinary alliances, she argues, not our conflicts, ought to form "the basis of a robust and collective response to our various publics" (CI, p. 785).

The four case studies of disciplines in the volume must have, originally, been among the strongest and most provocative of the papers at the conference; but they seem an unusual selection for an issue on the fate of disciplines: science studies, religious studies, cinema studies, philology, and two additional essays on the disciplines and the arts. All of the essays manifest the powerful relationship of both disciplines and interdisciplinary studies to the public world, though the social contract is barely mentioned in the general discussions of the disciplines. The essays on religious studies and philology—including classics—testify to difficulties of survival in the present time. The force of secularity, the difficulties since 9/11, the war on terror, and the rise of global religious politics have brought "an incommensurable divide" between religious and secular world views, greatly challenging this frequently interdisciplinary area of study. Scholars must struggle to show that the religious and the secular are concepts that are more interdependent than one thinks. One essay included is devoted to an explanation of the way that paradigms of a discipline such as theology may offer resolutions to nearly irresolvable cultural conflicts, such as the recent debates and terrorist threats over the 2005 Danish cartoons depicting Muhammad. Classics, also, struggles as a discipline in a time when only the present is valorized over the past.

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The Fate of the Disciplines ...

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Cinema studies and science studies stand out as the most instructive on public audience and context. Dudley Andrews in an essay on the development of film studies describes in rich and often humorous detail the effort to rein film studies into a disciplinary paddock without being thrown from the horse (CI, p. 879.) It wasn't at all clear that the academy was the best home for its development. The critical public, vast and energetic, was reluctant to see the study of film enter the university, and it remains very active. Nevertheless, academic development led to film theory—with help from the cine-clubs of Paris—and that in turn, eventually, resulted in new abilities to address the cultural and aesthetic issues posed by all of visual culture. Film studies entered the academy through a variety of differently labeled departments and programs such as Cinema and Comparative Literature. Ironically, Andrews argues that it is not "a discipline" in the usual sense of being well-formed and formally structured, though it is a legitimate member of the humanities. He acknowledges it borrowed its aesthetic practice from the English department, and he suggests that the term "discipline" was simply a rationale for the autonomy of film studies with respect to other departments. He warns, however, that film studies should be sufficiently structured so that students can grow term by term in the depth, breadth, and subtlety of their film analyses and historical inquiries, and he feels most programs fail to do this.

The articles on science studies examine the relationship of the field to the history of science with which it originally had a close relationship. The two separated over time, partially through divergence in their conception of the subject matter of science. Science studies focused on the social construction and responsibilities of science and often found themselves forced to challenge its validity by demonstrating covert political agendas (CI, p. 800). Thus scientists lost all interest, and the precise public for science studies seems yet to be found. Historians of science became more interested in perceiving the workings of science in the past on its own terms, and thus submitted gradually to the practices and the ethos of history (CI, p. 809). Strikingly, Lorraine Daston argues that scholarship in that field, though excellent, is now often "curiously inert, finely wrought but flat"; and she argues that a new form of interdisciplinarity might be forged with philosophy for energy and vitality. Mario Biagioli, in turn, argues that the humanities have been the best alliance for science studies and lays out a detailed agenda for humanists who wish to work with science studies. Biagioli also argues that we should initiate and reflect on the reorganization of knowledge in the university and study the networks, assemblages, problem clusters, and trading zones often found in the sciences.

Throughout this volume, pages separating the articles show photographs of an art project by Helen Mirra, consisting of words and terms from the indexes of two books by authors well known for their connection to Chicago and the university, which she had painted on the walls throughout buildings on the campus by a sign painter. An example would be the words: *generalities, glittering 32,* painted along a stairwell in the philosophy department. The texts are John Dewey's *Experience and Nature* (1925) and Jane Addams' *Newer Ideals of Peace* (1907).

Thus a vision of interdisciplinarity and theory under siege concludes the volume. Clearly the question of the fate of the disciplines raised in this volume is not "What is a discipline?" but what is to be the future organization and structure of knowledge in the university, how is it to be transformed, and by whom. Julie Thompson Klein argues in *Creating Interdisciplinary Campus Cultures* that interdisciplinarity is part of a common enterprise and situated within the larger academic agenda. Partnerships have real appeal in the current financial squeeze, and interdisciplinarity can enhance the space for organizational collaboration (Klein, p. 160.) In a time of the worst financial crisis of state budgets in decades, we need to become aware of our invisible corporate "suits," which create institutional detachment, direct commitment to the self, and paralyze action. Such corporate behavior, though natural, results in discussions of "the fate" of both disciplinarity and interdisciplinarity. Anyone who has worked with a faculty union knows that the faculty's right to shape the curriculum is a legal one. One's legal rights need to be exercised in a time when actions occur such as that of the state Board of Regents in Louisiana, which established a policy allowing universities to declare financial exigency in connection with individual programs. In spite of the recession, we should recall that the problems of the organization of knowledge in the university are realistically part of the transformations upon us in the 21st century. They shape our destiny but do not have to create "our fate." I have myself made some suggestions concerning restructuring in a chapter on the administration of interdisciplinarity in the forthcoming Oxford *Handbook of Interdisciplinarity.* These suggestions are based on actualities that presently exist. Interdisciplinarians are well prepared by the interdisciplinary paradigm to act thoughtfully, and the present time necessitates that we do so as both this volume and that of Henry and Augsburg demonstrate.

Louis Menand in *The Marketplace of Ideas* recently devoted an entire section to "interdisciplinarity and anxiety." Anxiety about interdisciplinarity (especially in humanities disciplines which have lost their paradigms) is an expression of frustration," he argues (Menand, p. 124). In the '60s and '70s, he notes, we had dreams we could transform our academic world by theorizing about it, but we got the theories in the same old box. We want to contribute to society, and "we are a little sick of the institutional armature we once may have desired to secure us." (Menand, p. 124). Menand asks, too, that we prepare to transform it. ■■■

Interdisciplinarity, Creativity, and Learning

Monograph on mathematics ranges from paradox to pedagogy

Review of *Interdisciplinarity, Creativity, and Learning: Mathematics with Literature, Paradoxes, History, Technology, and Modeling*. Edited by Bharath Sriraman, Viktor Freiman, and Nicole Lirette-Pitre. Charlotte, NC: Information Age Publishing (2009).

Review by David Sill, Senior Scholar and Professor, Southern Illinois University, Edwardsville.

Seventh in the Montana Mathematics Enthusiast's series in mathematics education, this monograph contains 16 chapters by multiple authors organized into five sections: I. Interdisciplinarity in Mathematics and Literature, II. Mathematics and Paradoxes, III. Geometry and History, IV. Interdisciplinarity and Modeling, and V. Technology and the Net Generation. The monograph is international in scope with authors coming from the United States, Canada, Japan, Denmark, and Australia. Bharath Sriraman is listed as first editor and is author or co-author of six of the first seven chapters. The other two editors, Viktor Freiman and Nicole Lirette-Pitre, co-authored a single chapter.

The title of the monograph sets up expectations for an exploration of the relationship between interdisciplinarity, creativity, and learning. It turns out the chapters consider isolated aspects of the title, such as paradox and learning without considering interdisciplinarity or creativity; or mathematics and literature taught as separate classes with neither interdisciplinary nor creativity content, goals, pedagogy, or structure. None of the chapters discuss interdisciplinarity, creativity, and learning together. A few chapters discuss interdisciplinarity and most but not all chapters discuss some aspect of learning. Only one chapter focuses on creativity. The examples of interdisciplinarity appear to be examples of applied mathematics, as in engineering, or of disciplinary poaching, as in using literature to teach mathematics. Most of the chapters consider one of the sub-topics, e.g., paradoxes, history, or technology in relation to one of the primary topics, e.g., interdisciplinarity or learning.

Particularly due to the number of authors and the variety of their approaches, an introduction would have been useful to make visible the connections between various subjects and to frame an overall conceptual frame for the monograph. The description on the back cover clearly places the monograph on interdisciplinary ground promising that the monograph will put "forth the view that interdisciplinarity and creativity are related constructs, and that the cultivation of domain general creativity is possible." While asserted in the description, these two ideas are neither developed nor discussed anywhere in the monograph. The one discussion of creativity is domain specific, mathematical creativity. The final sentence of the description states that the chapters illustrate pedagogies and curricular strategies that serve "as a conduit for interdisciplinarity, creativity and learning to occur." For neither interdisciplinarity nor creativity is there any analysis of exactly how that is to happen or whether it in fact did or does happen with the pedagogies described. Anyone who purchased this book looking for insights regarding interdisciplinarity and creativity would be greatly disappointed. At the same time, for anyone engaged in interdisciplinary work who already has an understanding of interdisciplinarity, the monograph may have some value in pedagogies adaptable for interdisciplinary work and in the theoretical ideas concerning paradox and polymathy.

The one chapter that explicitly discusses interdisciplinary theory, Iverson's "Modeling Interdisciplinary Activities involving Mathematics and Philosophy," defines interdisciplinarity in terms of shared space. In the section titled "Theoretical Framework" Iverson presumes that interdisciplinary work relies on general and identical overlaps between disciplines, living in those shared spaces. In the specific case of interdisciplinary work involving mathematics, Iverson looks for "…the possible intersection of knowledge between mathematics and other subjects" (p. 149). While several of the chapters involve work in shared spaces as suggested by Iverson, none of the chapters involve integrating the disciplines themselves beyond those shared spaces. Shared spaces correspond to Paxson's least interactive mode of interaction between the disciplines (2006, pp. 79-80). Missing is any aspect of what Lindauer refers to as reciprocity, taking materials and ideas from one discipline, processing them according to the methods of a second discipline, and returning them to the first where they may be further developed (1996, pp. 5-6). In the individual chapters and in the book as a whole, there is no sense of disciplinary encounter or interaction that is central to the notion of reciprocity. Admittedly, the book concerns secondary and elementary teaching of mathematics where altering disciplinary norms through interdisciplinary encounter can have political consequences. At the same time, the title and the back cover description promise more than only shared spaces where disciplines intersect, the convenience of overlap. And the promised "conduit for interdisciplinarity, creativity and learning to occur" implies far more reciprocity than shared spaces allow.

The first section, Interdisciplinarity in Mathematics and Literature, includes four chapters that in one way or another discuss

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both mathematics and literature. The first two chapters, "The Interdisciplinary Nature of Inductive Processes in Forming Generalizations" and "The Existential Void in Learning," tie together work in mathematics and work in literature by claiming shared spaces—inductive process and critical thinking as patterns of reasoning—fitting Iverson's model. The third and fourth chapters, "Mathematics and Literature" and "Mathematics and Literature (The Sequel)," discuss using literature in an algebra course for ninth-graders (13-14-year-olds), and are perhaps the most interdisciplinary chapters in the monograph.

The references in the second chapter to the existential void and to Victor Frankl are needless and confusing, and in the case of Frankl who developed logotherapy while working in German concentration camps during WWII, the reference borders on hyperbole. The chapter's definition of existential void is embedded in the third sentence: "A student, whose learning experiences in school lacks [sic] moral or ethical guidelines which does [sic] not have the power to give meaning to her world, experiences the existential void" (p. 13). This awkward and ambiguous sentence appears to state that students must have powerful moral learning experiences and ethical guidelines in school to give meaning to their world, or otherwise they will experience an existential void. Is this arguing for the schools to replace religion? Or replace family? Or replace tradition, culture, or patriotism?

Chapter 3 describes a class that used the novel, *Flatland,* to develop a deeper understanding of mathematics, especially regarding dimensions, limits, and dilemmas, while exploring social issues raised in the novel. The real interdisciplinary work has been done by Abbott and Stewart. In his review of *Flatterland* for the Mathematical Association of America, Banchoff points out that *Flatland* contains "several levels of structure, sociological, linguistic, pedagogical, and religious" (2001). Additionally, Banchoff points out that *Flatterland* also challenges the reader on a sociological level, particularly concerning gender roles. Accepting that the works *Flatland* and *Flatterland* are interdisciplinary constructions from the beginning, the very use of these novels in an algebra class introduces interdisciplinary pedagogy to the teaching of mathematics. Furthermore, the interdisciplinary content of the novels is reinforced by the class discussions that grew out of the readings regarding class structure and gender roles in society. In the end, with the exception of a few isolated chapters in sections that follow, the first four chapters in the book include more discussion and development of interdisciplinarity than any of the sections in the rest of the book.

The three chapters on paradox in Section II, Mathematics and Paradoxes, shift from interdisciplinarity to ambiguity, uncertainty or indeterminacy and suggest a pedagogy that may have application in interdisciplinary studies, but they do not explicitly discuss interdisciplinarity or creativity. Any connections are left to the reader. The two areas of likely interest to the interdisciplinary community are first, the use of ambiguity, uncertainty and indeterminacy to unsettle students, and second, the guided questioning of the disciplinary foundations of mathematics. The use of paradox, which is firmly rooted in the discipline of mathematics, forces students to confront mathematics with ambiguity, uncertainty, and imprecision, rather than from the more comforting view that mathematics is fixed, certain, logical, and consistent.

The first of the three chapters in section II is very short and discusses a paradox for which there are two arguably right answers that hinge on foundational assumptions or definitions. The question hinges on whether a null set can count as a subset of a set of finite non-zero size. As the authors point out, the questions that arise are more philosophical than mathematical (p. 59). While not in itself interdisciplinary, encountering questions from outside the realm of the discipline stretches the boundaries of the class. This is a short chapter that could have been strengthened by including more assessment results, particularly in terms of how the course altered the students' understanding of mathematics as a field.

The second chapter in Section II presents the use of paradox as a pedagogy for sharpening reasoning. The author connects paradox and implicitly creativity by arguing that students must let go of preconceptions and habits of thought to resolve paradoxes. If paradoxes are caused by restrictive mental constructs, then the resolution of the paradoxes relies on new ways of thinking and different strategies or approaches (65). At the same time, there is some question whether the benefits of using paradoxes as pedagogy can benefit all students. The author raises the question whether attempting to resolve paradoxes can help students learn to re-organize their thinking or if only those students who can already re-organize their thinking can satisfactorily resolve paradoxes and benefit from the mental exercise involved. The question of accessibility can also be asked about integrative thought and interdisciplinary pedagogies. Does interdisciplinary pedagogy and curriculum teach integrative thought, or is it only those students who are already capable of integrative thought who can benefit from interdisciplinary pedagogies and curriculum?

The third chapter in Section II—mathematic paradoxes as pathways into beliefs and polymathy—argues that the use of paradox can "foster polymathy, change beliefs, discover structures and open new avenues for interdisciplinary pedagogy" (p. 75). The intent is transformational—"How can deeply rooted beliefs about the nature of mathematics be impacted?" (p. 76). Drawing predominantly on Root-Bernstein with references to Sternberg and Simonton, Sriraman claims eight common thinking traits typical to polymaths, including visual geometric thinking and/or thinking in terms of geometric principles; frequent shifts in perspective; and nepistemological awareness, i.e., an awareness of domain limitations (p. 79). Unfortunately, the list of polymathic traits is contradicted by the sources cited, particularly Root-Bernstein. For example, Root-Bernstein contradicts the chapter's first trait, geometric thinkers, by identifying differences between artistic scientists (visual and imageless-nonverbal thinkers), musical scientists (visual thinkers), sculptor-scientists (imageless-nonverbal and kinesthetic thinkers), and writer-scientists (verbal thinkers), the last two of which are clearly not geometric thinkers (2003, p. 270).

There are three chapters in Section III, Geometry and History. While the chapters are interesting, they appear to have no connection to interdisciplinarity, creativity, or learning.

Section IV, Interdisciplinarity and Modeling, includes the Iverson model of interdisciplinarity discussed above (Chapter 11). Chapter 12 discusses engineering problem solving and model building for elementary and middle school curriculum, an integration of engineering and mathematics education. There are several important learning goals that are part of engineering education in elementary and middle school mathematics: dealing with an increasingly complex world of information and technology and applying what is learned in the classroom to real-world problems. Chapter 13 then provides a concrete example of the integration of engineering education with the elementary mathematics curriculum. In that chapter, Lyn English and James Watters discuss the use of modeling activities in four classes of 8-year-old third-grade students. While evidence is provided for the effectiveness of the modeling pedagogy, it is unclear that the pedagogy is qualitatively different from the traditional word problem or application pedagogy that has always been part of elementary mathematics curriculum. There may be a difference in degree but not in kind.

Interestingly, another article written by English published in the *Proceedings of the 30th Annual Conference of the Mathematics Education Research Group of Australasia Annual Conference* in 2007 provides a much better explanation of the interdisciplinary structure possible in modeling problems and raises some interesting and possibly useful ideas that are missing from the chapter included in the monograph. Contrary to the chapter, the article begins with an intentional look at the interdisciplinary focus and creativity: "This paper examines one approach to promoting creative and flexible use of mathematical ideas within an interdisciplinary context in the primary curriculum, namely, through modelling" (p. 1). Unlike the interdisciplinary focus of the 2007 article, Chapter 13 begins with, "in this article we explore young children's development of mathematical knowledge and reasoning processes as they worked two modeling problems (the *Butter Beans Problem* and the *Airplane Problem*)," with neither reference to interdisciplinarity nor creativity. The chapter goes on to firmly place the modeling pedagogy in the discipline of mathematics: "The problems involve authentic situations that need to be interpreted and described in mathematical ways" (p. 177). In contrast, the 2007 article used an interdisciplinary construction for the modeling problem: "Three classes of 5th-grade children worked on a modelling problem (Australia's settlement) situated within the curriculum domains of science and studies of society and environment." After working through the chapters in the monograph which appear to have very little connection with the stated focus of the monograph, it was refreshing to find an article by one of the authors that actually discussed and developed ideas that reflect the title of the monograph, *Interdisciplinarity, Creativity, and Learning*, and that explores two aspects from the subheadings, history and modeling.

Section V, Technology and the Net Generation, includes three chapters. Chapter 14, "Connected Giftedness—Mathematical Problem Solving by Means of a Web Technology: Case of the CASMI Project," addresses the problem of providing more challenge for mathematically gifted students by using the online "virtual mathematical and scientific problem solving community" (p. 207). While there is a tendency to connect giftedness with creativity, there is a clear ambivalence concerning a focus on giftedness.

Chapter 15 presents a theoretical argument for using Web-based pedagogies for teaching the Net Generation, describing its norms as freedom, customization, openness, collaboration, speed, and innovation. These norms suggest a change from sequential and hierarchical learning to hypertextual learning, making "more leaps and multiple links between specific concepts and to an extent, different subjects" (p. 225). This implies that the Net Generation may be more open to considering multiple disciplines simultaneously in their studies than earlier generations of students. The resulting pedagogical principles are: 1. for the teacher to let go of authority, 2. to empower students as teachers and knowledge creators, 3. to encourage collaboration, 4. to recognize and be guided by individual learning capabilities, and 5. to recognize the importance of creativity and critical thinking. In many ways, this list of Net Generation pedagogical principles is not that different from common active learning pedagogies that have been incorporated across higher education since the 1990s.

The final chapter, which is the only one that includes "creative" in the title, includes a short discussion of creativity theory. Based on the idea that the focus of mathematical pedagogy on single right answers inhibits mathematical creativity, the chapter presents a study that measures fluency, flexibility, and originality among students aged 11-13 years, solving a multi-solution problem. The case study used an online framework for presenting the problem and for collecting the results. The use of open-ended questions as in the final chapter or paradox as in section II could have benefits for interdisciplinary pedagogy as well.

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Rev up your imagination for Name the Newsletter Contest!!

The *AIS Newsletter* will have a new look beginning with the October 2010 edition!!

We plan to make changes in the design of the newsletter and to launch some new content areas while keeping existing ones. Among the new content areas will be articles on pedagogy, integrative learning, and the scholarship of interdisciplinary teaching and learning; job listings; articles by graduate students and international members; and, of course, the book review-essays, conference announcements, AIS announcements, and other features in recent newsletters. We encourage members to submit brief (250 word) articles on interdisciplinary studies and integrative learning and would especially like to hear from international members and graduate students. Check the AIS Website (www.muohio.edu/ais/) and Facebook later this year for details on how to submit the brief articles.

As part of the revamping of the newsletter, the AIS Board of Directors is launching a Name the Newsletter Contest. Members should send their suggestions for a new name by August 1, 2010 to aisorg@muohio.edu with Newsletter Contest in the subject line, or mail it to the Association for Integrative Studies, Miami University, Western College Program, Oxford, Ohio 45056. The general membership will vote on the top proposed names, and the winner will be announced at the 2010 AIS conference in San Diego. The prize will be a hardback copy of the 1998 AIS-sponsored anthology, *Interdisciplinarity: Essays from the Literature*, edited by William H. Newell. ■■■

IDS, Creativity, and Learning ...

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The Association for Integrative Studies
Western College Program
Miami University
Oxford, OH 45056

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