Undisciplining Knowledge: Interdisciplinarity as an ideology and as practices

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The ubiquitous appearance of the term "interdisciplinary" in recent academic and educational writing suggests that it was rapidly becoming the dominant form of scholarly work. Major newspapers and periodicals created the same impression, especially in their discussion of research on current issues ranging from healthcare, to the environment, and national security.

At the same time, commentators have always disagreed about how they define "interdisciplinarity" and how they conceptualize relationships among disciplines and interdisciplines. Some see pluralism or multiplicity as positive; others see it as problematic and obstructive to intellectual advancement. Discussions for almost 75 years sway backward and forward. There is often more hype—and heat—than light, and arguably even loss. The classic, indeed, stereotypical example is C.P. Snow's *The Two Cultures and the Scientific Revolution*, already out-of-date upon publication in 1959 in its opposition of "science" and "culture." (See among many examples Fish 1989, Davis 2007)

Among the complications is the confusion, and underlying contradictions, of approaches that construe one form of interdisciplinarity or another--separate from established disciplines--as the path to research and knowledge. The contrasts sharply with the "anything goes" incoherence across the topic. One author, for example, refers without distinctions or definitions within a few pages to interdisciplinarity, integration, transdisciplinary, multidisciplinary, transcendent interdisciplinary, interaction, intersection, complexify [sic], relationality and translation, professionalize, interprofessionalism, expand, holistic and multileveled, problem-solving, policy studies, and team science as synonymous and interchangeable. (Klein, 2018) The dichotomies too often devolve into dichotomies that interfere with collegial conversations and cooperation.

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Recognizing that interdisciplinary work demands a greater command of knowledge and methodologies than individual scholars may possess, many universities contend that the organization of learning, and of scholarly work, depends on collaboration. These positions reveal a pronounced if sometimes conflicting and contradictory discourse of interdisciplinarity. Too often, approaches become oppositional as each asserts uncritical presumptions of its own independent transformative power and vital importance.

Debates without sufficient grounding also display implicit and explicit tensions between applied research and fundamental problems of knowledge or theory, as well as conflicts between existing disciplines and emerging ones. (Compare, for example, Graff 2015, Jacob 2014, Millgram 2015, with Klein 1990, 2018, Frodeman 2010)

Contrary to what I construe as one or more *ideologies* of interdisciplinarity, these tensions serve to underscore that *disciplinary and interdisciplinary work are inextricably linked.* They are not dichotomously opposed as many commentators simplistically see it. Each depends on the others, in varying formations.

It has not been recognized sufficiently that *both disciplinary and interdisciplinary work* are mutually dependent and interactive. In a discourse sharply shaped by conflicts and dichotomies, the more recent campaigns for one conception of interdisciplinarity or another are often framed as a reaction against overspecialization and fragmentation in the disciplines. (See Millgram 2015; contrast with Frodeman 2010, Klein 2018) Some urge integration and synthesis while others, less ambitiously, declare that critical problems demand collaboration among specialists from different fields and disciplines.

A more complete appreciation of interdisciplinarity's development demands a longer look backward, at least to the late-nineteenth-century origins of modern disciplines in the developing research university and the relationships among them. This is the task of my 2015 book *Undisciplining Knowledge: Interdisciplinarity in the Twentieth Century.*

Disciplinarity and interdisciplinarity stimulate, shape, and inform each other, as the making of biology, among other foundational fields, demonstrates. In that volume, I critically compare and contrast the fields and disciplinary clusters of genetic biology and sociology, humanities and communication, social relations and operations research, materials science and cultural

studies, and bioscience and literacy studies over more than a century.

Despite the growing diversity of interdisciplines, the ideology of interdisciplinarity often remains linked to "big science" as a normative model. It has shaped and continues to shape expectations for, and evaluations of, interdisciplinarity in nonscientific as well as scientific research. Large-scale, team-driven, expensive experimental science has become hegemonic in current thinking about the ideal scale and organization of research. (See Abbott, 2001, Graff, 2015, 2021)

With those expectations come judgments of importance that diminish or overlook the interdisciplinary work of individual scholars and small groups which is more appropriate to other fields and many problems. Efforts to claim the trappings of "big science" multiply mimetically. Too often they dictate institutional developments and impose an inappropriate model across the expanse of diverse fields of knowledge.

Many interdisciplines, including communication, cognitive studies, and operations research, have at one time or another attempted to pass as sciences. Today, we hear of "quantum" this or that, the self-contradictory "data science," "reading science," and even "story science." Attesting to the power and lure of science as a cover or badge of status, this effort has confused questions about the wider applicability of the standard version and made it harder to identify alternative forms, locations, organization, and expectations. (Compare Jacobs 2014, Graff 2015, Milgram 2015 among others.)

Describing what I call the "standard version" of interdisciplinarity, the National Institutes of Health provides a succinct, conflict-free, and romanticized account of a "great transformation" neatly unconstrained by time, place, and historical context. These "new ways" depend on changes in academic research culture and proudly, albeit ironically, claim their status as unconventional and distinctive. In saying, "As opposed to multidisciplinary research," they describe what is, in effect, multidisciplinary research. They assert rather than explain how "this model draws together researchers to address a problem that transgresses the borders of their separate fields but does not rely on the invention of new methodologies." (Note their rhetorical and ideological use of the word "transgresses.")

How well does this new standard fit the most important interdisciplinary breakthroughs in the past? Unusual wartime

circumstances propelled the Manhattan Project, a collaboration between leading scientists and military and civilian organizers, which invented the atomic bomb. Watson and Crick's collaboration in identifying the structuring of DNA's double helix was relatively informal, as their exclusion of coworker Rosalind Franklin indicates. Close coordination among many laboratories in separate institutions contributed to mapping the human genome. How could we assess the crucial roles of external circumstances, nonscientific influences, institutional elements, leadership, and specific circumstances, as they interacted with intellectual breakthroughs and the marshaling of resources?

Certain factors emerge as especially significant, chief among them the location, relationships and organization of the interdisciplinary effort, and its historical context. Preconditions, particularly research pointing the way to the critical moment and the social and political-economic context, matter enormously. At different times, and in different contexts, interdisciplinarity takes recognizably different terms, forms, and locations and faces distinctively different chances of success or failure. "Success" itself is far more complicated than the new interdisciplinarity ideology claims, not least because disciplinary specializations can be sources, rather than obstacles, of breakthroughs.

Despite a historical legacy, the strong presumption remains that change is recent and concentrated in the sciences, and that others must mimic them regardless of appropriateness. "Integration" and "convergence" –most often undefined rhetorical terms--are the new mantras. Can this version of interdisciplinarity bear the claims made for it?

In the past, the greatest amount of interdisciplinary research and teaching, by far, lay in specialized and advanced studies. In contrast, the new standard calls for general, or so-called "integrative" work, in curricular and program development, especially for undergraduates. In practice, both general, nonspecialized, *and* specialized work can be integrative: either or both disciplinary and interdisciplinary.

A certain unhelpful rhetoric substitutes inadequately for conceptualization, asking questions that stretch the limits of any one discipline, literally demand new approaches and sometimes methods, and transcend disciplinary boundaries. Critically, every new development does not merit the status and segregation of a disciplinary or interdisciplinary department. Much, perhaps most interdisciplinarity progresses within departmental organization.

That has always been the case. But the ways we talk about interdisciplinarity can confuse this, and much else.

Let me be clear. Just as I support well-founded, serious interdisciplinarity, applaud targeted research initiatives and the encouragement of further communication and collaboration across intellectual boundaries—and, moreover, try to tolerate unavoidable faddishness and enthusiasms—the abuses of interdisciplinarity are also troubling.

We have learned at great cost and sometimes bitter disappointment the fallacies of multidisciplinary "wars" on poverty, cancer, drugs, history, communication, the human genome, and on and on. The gains, while sometimes invaluable, are always less than promised, and probably less than more carefully coordinated problem- and question-driven interdisciplinary efforts would promote.

> My own view begins with the understanding that interdisciplinarity is part of the historical making and ongoing reshaping of modern disciplines. It is inseparable from them, not oppositional or an alternative to them. The organization, production, and dissemination of knowledge around universities, disciplinary departments, and research institutes, especially in the United States and Europe, have long given rise to interdisciplinary efforts and movements. Over time, those endeavors have crossed disciplines and disciplinary clusters in different ways and with differing outcomes.

Interdisciplinarity is defined and constructed by questions and problems of theory or practice, knowledge or conditions of living, and the means developed to answer those questions in new and different ways. Interdisciplines are fashioned from elements of different disciplines to form distinct approaches, understandings, or contexts. Interdisciplines are themselves historical constructs. Questions and problems should spur interdisciplinary work, not the number of disciplines that are supposedly "mastered," "integrated," or "transcended." In the making of interdisciplinarity, disciplinary elements are interactive, not additive or subtracted.

Interdisciplinarity derives from the selection of appropriate and relevant ideas, approaches, theories, concepts, methods, and comparisons from different fields or disciplines. Those choices, whether successful or not, influence central questions and problems.

In no way does interdisciplinarity depend on knowledge of entire disciplines or on global notions of the unity of knowledge. *There is no single path to interdisciplinarity, no single model, no single standard for successful development.* The process and results vary across disciplines and clusters of disciplines.

The long and complicated history of interdisciplinarity supports a strong argument to employ much greater care in the use of the word and its associated vocabulary. This is necessary to preserve and advance its provenance and power. Those who pronounce transdisciplinarity or, more recently, "convergence" to be "beyond interdisciplinarity" are seldom aware of the baggage that those terms carry.

Abuse of the term can often be traced to a lack of familiarity and knowledge of the fields, and their histories, that are supposedly interrelated. All scholarly researchers need familiarity with the philosophy and sociology of knowledge. This is particularly evident in the humanities and social sciences with respect to "cognitive science" as well as within the sciences themselves. Metaphors too commonly substitute for understanding. Grandstanding on all sides of these debates obscures the advances that interdisciplinarity in practice facilitates.

These are very real questions today, as they were in 1980, 1950, or 1910. What is at stake is the framing of efforts to make progress on major intellectual and social problems; issues of public policy; the allocation of resources, including the time and efforts of people and institutions; the articulation of organizations and structures; and professional careers and human lives.

I am not asserting that such systematic and flexible attention will resolve all the complications. But I do think that it would be a major step forward. Recognizing differences, tightening sloppy language and thinking, and promoting respectful exchanges and strategic planning would do even more. This approach also suggests different relationships between and among the sciences, social sciences, humanities, technical and professional fields, and "pure" and applied endeavors.

Interdisciplinarity is often misunderstood. Yet I remain a believer, albeit with qualifications, as a result of my education; experience as a researcher, writer, and teacher; various university roles and responsibilities; the influence of the world in which I grew up; and my sense of the world we now inhabit and how we might make it better.

"Doing" interdisciplinary work differs from "talking" interdisciplinarity. Interdisciplinary efforts differ among and within different disciplinary clusters. There is no single organization, form, pattern of institutionalization, or set of rules that signifies interdisciplinarity.

This history warns us of the dangers of exaggeration, excessive claims of novelty, and imitation, especially a simplified model of scientific research. It emphasizes the centrality of humility, learning the basics, doing one's homework, and recognizing and appreciating variety and variability.

Note: This essay was initially drafted on invitation and under contract for *The Elgar Encyclopedia of Inter- and Transdisciplinarity,* ed. Frederic Darbellay. Despite that, Darbellay violated his own signed contract because of my documented criticism of "transdisciplinarity."

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