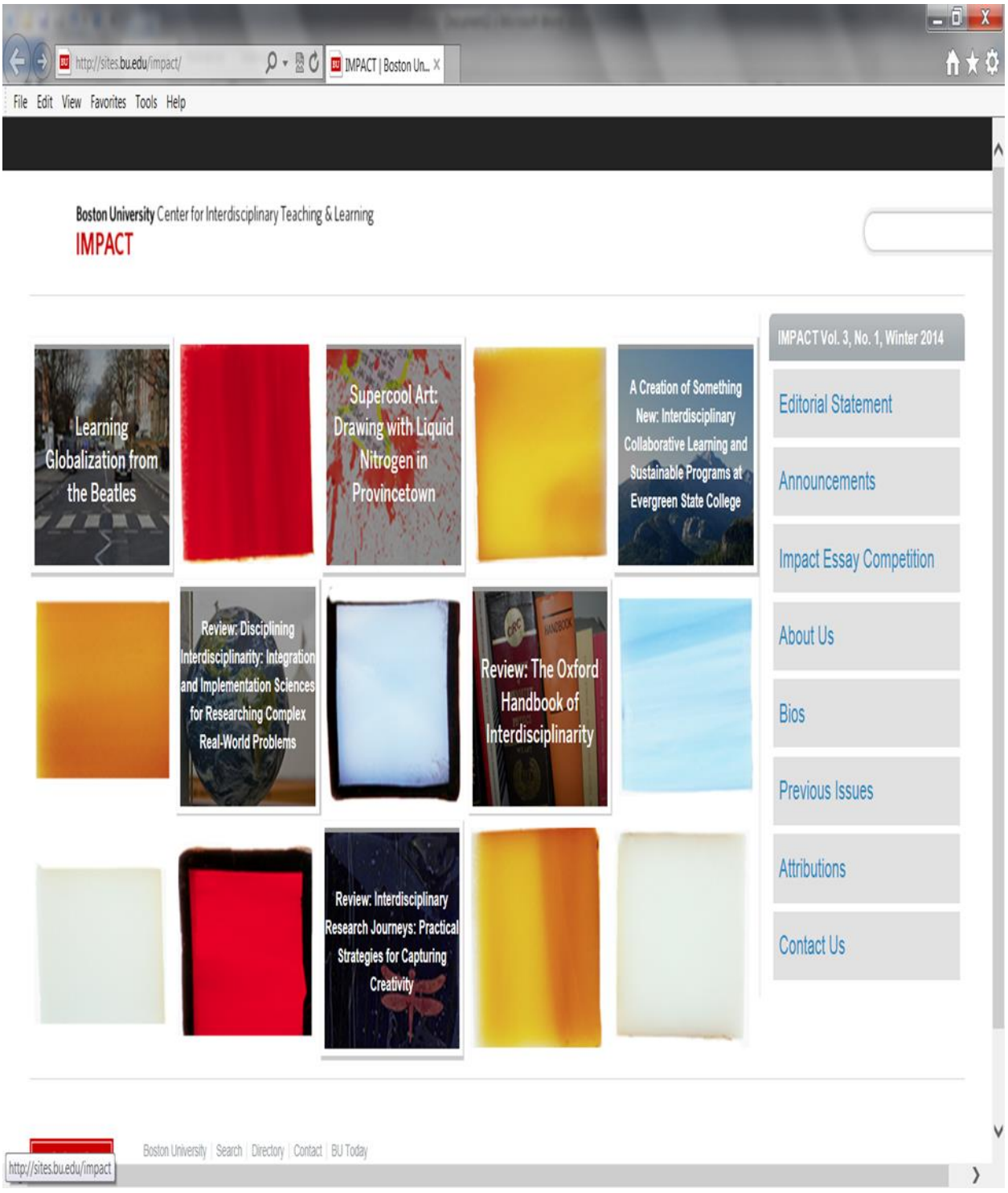

http://sites.bu.edu/impact/
IMPACT | Boston Un...
File Edit View Favorites Tools Help
Boston University Center for Interdisciplinary Teaching & Learning
IMPACT
Learning Globalization from the Beatles
Supercool Art: Drawing with Liquid Nitrogen in Provincetown
A Creation of Something New: Interdisciplinary Collaborative Learning and Sustainable Programs at Evergreen State College
Review: Disciplining Interdisciplinarity: Integration and Implementation Sciences for Researching Complex Real-World Problems
Review: The Oxford Handbook of Interdisciplinarity
Review: Interdisciplinary Research Journeys: Practical Strategies for Capturing Creativity
IMPACT Vol. 3, No. 1, Winter 2014
Editorial Statement
Announcements
Impact Essay Competition
About Us
Bios
Previous Issues
Attributions
Contact Us
Boston University | Search | Directory | Contact | BU Today
http://sites.bu.edu/impact

ABOUT US

EDITORS

BOOK REVIEW EDITOR

EDITORIAL ADVISORY BOARD

IMPACT: The Journal of the Center for Interdisciplinary Teaching & Learning is a peer-reviewed, bi-annual online journal that publishes scholarly and creative non-fiction essays about the theory, practice and assessment of interdisciplinary education. Essays should be between 500 and 5,000 words and should follow the documentation style of the author's main discipline. Essays can be submitted at: http://CITL.submittable.com/submit. For questions, contact Megan Sullivan at msullvan@bu.edu.

IMPACT is produced by the Center for Interdisciplinary Teaching & Learning at the College of General Studies, Boston University. www.bu.edu/cgs/citl.

ISSN 2325-0232
ISBN 10-0615582478
ISBN 13-978-0-615-58247-4

CURRENT & PREVIOUS ISSUES

Please find listed below the previous issues of *IMPACT*:

- Winter 2014 issue
- Summer 2013 issue
- Winter 2013 issue
- Summer 2012 issue

EDITORIAL STATEMENT

Welcome to *IMPACT*'s third year of publication! As many of you know, *IMPACT: The Journal of the Center for Interdisciplinary Teaching & Learning* is the peer-reviewed online journal published by faculty and administrators at the College of General Studies, Boston University, and is dedicated to exploring the interconnections among disciplines. The journal is also keen to demonstrate how interdisciplinary research and pedagogy not only inform, but also illuminate one another.

A two-year, team-taught, interdisciplinary general education program, the College of General Studies has always encouraged students to integrate two or more disciplines into their thinking and writing. By the time they leave our College to matriculate into their majors at Boston University, we want our students to be well-versed in the art and practice of thinking through disciplines to the connections and dissonances that can help them become stronger scholars and attend to real-world problems.

Whether they consider themselves interdisciplinary, cross-disciplinary or trans-disciplinary, *IMPACT* readers and writers are also committed to ways of thinking that account for various disciplines and diverse ways of knowing. As a result, our writers often explore how disciplines inform, complicate or otherwise alter one another; or they examine how interdisciplinary thinking makes undergraduate education and higher education better and more robust. Despite their diverse interests and fields, the teachers/ scholars/writers whose prose grace the pages of our journal share a keen sense that what they have to say can help another person in his or her intellectual journey. That seems a fine model for our future students as well.

To usher in our third year of publication, and as a gesture of thanks to our founding editor, Natalie McKnight, *IMPACT* has undergone a bit of an aesthetic transformation. We mean this transformation to commemorate what has occurred over the past four issues – *IMPACT* has asserted its voice in the field of interdisciplinary studies – and to welcome the future. For this voice, we heartily thank College of General Studies Dean *ad interim* Natalie McKnight.

Although aesthetically our journal may look different, we still look forward to your submissions, just as we always have. You can find all the relevant information about submissions, archives, and our annual BEST ESSAY AWARD on our homepage. Thank you for taking us along with you on your intellectual journey.

Megan Sullivan, Editor

ESSAYS

"A Creation of Something New": Interdisciplinary, Collaborative Learning, and Sustainable Programs at the Evergreen State College

KATE REAVEY
Union Institute and University

Interdisciplinarity presumes connection, the interrelationships among individuals and systems (Klein 2005; Holley 2009). What emerges from these connections is not the acquisition of something fixed or static but a dynamic system of framed points of reference (Meyer 2007). Through sustained attention to collaborative learning and interdisciplinary approaches, the Evergreen State College (TESC) continues to engage these "framed points" more than thirty years after its founding in 1967. In their book-length study, *Reinventing Ourselves: Interdisciplinary Education, Collaborative Learning, and Experimentation in Higher Education*, editors Barbara Leigh-Smith and John McCann emphasize the practice of framing not only curricula but also assessment in order to sustain the innovative programs on TESC campus and beyond. Such "reinventing" may be the most useful and sustainable component of interdisciplinary education. Moving into a future with unknown challenges is the charge of every educational institution. Assessment and reevaluation provide instructive means for sustainability. TESC's commitment to reinvention is premised upon the continuing input of student perspectives. This provides for renewed attention to local, national, and global perspectives in the context of a rapidly changing world.

"Reinventing" through collaborative learning, in TESC's interdisciplinary model, is premised upon engagement of place and of the other-than-human relationships that shape and are shaped by human activities. TESC has both advanced and adapted in over forty years of experimental learning. Through collaborative leadership methods, TESC has not only become a model for other educational institutions but also a force for the creation of programs, institutes and initiatives such as The Washington Center for Improving the Quality of Undergraduate Education, the Reservation Based Community Determined Bachelors Program, and most recently the Curriculum for the Bioregions Initiative, all of which emerged from the Evergreen foundation and models for learning. In each of these names, there is an explicit attention to process: "Improving" requires continual attention toward adaptation rather than linear progress. "Community Determined" requires attention to changes along the course of the program because the "personal authority" of the student remains in dialogue with the community around him or her. Finally, the emphasis on "curriculum" in the Bioregions Initiative demands continued attention to the needs of the disciplinary or interdisciplinary approach an individual course will hold. The work that is being done within the faculty Learning Communities (LCs) requires educators to re-imagine or re-create a course they have taught or to create something new.

TESC values the practice of interdisciplinary teaching and learning beyond curricular initiatives and collaboration among faculty/ students and administrators; interdisciplinarity is embraced

within as well as outside the classroom through field studies and service learning projects. Smith, former provost for the college and a founding administrator, explains that "one of the few surviving nontraditional colleges established in the late 1960s, [Evergreen] also became the seedbed for a burgeoning national reform effort to restructure traditional curricula and pedagogy through learning communities" (LCs) (2001, p. 65). TESC was shaped by the work of John Gardner and Alexander Meiklejohn, as well as Dewey's pedagogical theories. The "Learning Community" as coined by Meiklejohn, remains central to teaching and learning projects supported by the Washington Center for Improving Undergraduate Education. According to Smith, "Evergreen's main features emerged in the first year and changed little over the next twenty-five years" (2001, p. 70). Interdisciplinary studies and collaborative learning were central "features"; so too was the "stress on collaboration and avoidance of hierarchy" (2001, p. 70). Faculty and administrators decided by consensus that the institution would operate with "no faculty rank or tenure, a uniform salary scale based upon years of experience, rotating academic administrators [and] use of narrative evaluations rather than [numbered] grades" (2001, p. 70). This provided an environment in which faculty remain committed to the rigor they require of students. Smith suggests that "the decentralization [that] was seen as a key element in maintaining an innovative climate at the college" led to practices such as "student portfolios, teaching team covenants, narrative evaluations, weekly faculty and student seminars [. . .] and a reappointment policy based on faculty teaching portfolios" which consequently "gave life to these new values" in collaborative teaching and learning practices (2001, p.70).

An interdisciplinary approach can be stifled or even destroyed if the question of sustainability is not addressed, and this requires assessment. The founding faculty and administrators for TESC emphasized critical inquiry and assessment both of and from the students. Student perspectives continue to be instrumental to the development of future curricula and the sustainability of the Evergreen model. Smith emphasizes that the "practices [that] later became part of the reform efforts in the 1980s and the 1990s in higher education as a whole" were the self-same practices that would need attention—and perhaps revision—in future years, in a continually changing local and global environment." Again she emphasizes "process," noting that "[i]n the process [of its inaugural year of experimental education], Evergreen developed new forms and languages which would become part of its identity and also part of its problem in relating to the outside world" (2001, p. 71).

As a result of this interactive model, various service-based programs were created, including The Longhouse Education and Cultural Center, which administered the Native American Economic Development Arts initiative and now provides the environment for the RBCD Bachelors program. The RBCD is premised upon the idea that the "personal authority" of the student in relationship with "indigenous knowledge" and continual "scholarship" such that the interaction among these elements will lead to individual and collaborative learning. "Personal authority" emphasizes the value of individual ideas and what some might call "voice" or agency. Personal, community, and ecological resources become crucial elements to learning in the RBCD program. Attention to the "local" is complemented by the scholarly/academic pursuits that provide for a broad-spanning, national and global consciousness. A geographical emphasis implicit in "indigenous perspectives" recalls Schoenberger's assessment that "rather than having interdisciplinarity happen to us in a way that actually reduces and flattens geography or in a way that serves someone else's purpose, [. . .] we should *create* the interdisciplinary projects and

take them out into the world" (2001, p. 380). Schoenberger notes that "[w]e do not start from a position of obvious power – but we do have the good ideas" (2001, p. 380), emphasizing again the possibilities through "ideas" or in Barthes' term "things." TESC provides a teaching and learning model that provides a framework for creating such "things" within the classroom, through research, field-studies, service learning, and publications (which benefits students and professors alike).

Smith notes that Evergreen is "sometimes referred to as [one of] the public liberal arts colleges or the public ivies" (2001, p. 65). She does not present this as a laurel upon which to rest. Rather, she constructs an inquiry into the first twenty-five years of the institution (Chapter 4 of *Reinventing Ourselves*) and asserts that its challenges led to the strengths and the sustainability of programs. Her contention is that the "new set of challenges" that will be faced "as scores of founding faculty members retire and many of its innovations have become mainstream" will likely be useful to the college; the "external pressures" in the early years had "helped the college survive by pushing the institution to continually expand its vision" (2001, p. 4). Such is the nature of interdisciplinarity; what we can count on is change and what we must rely upon are rigor, engagement, and an attention to multi-vocal perspectives of knowing.

This attention to pressure recalls the work of Gamson in her focus on "collaboration" in education: "collaboration meant not only to work together, especially in a joint intellectual effort, but to collaborate treasonably, as with an enemy occupying one's country" (2012). Noting the work of Romer and Whipple, Gamson calls our attention to the irony that "collaboration is often impeded by the inability to get past power differences between students and faculty" and continues by stressing that "on the typical campus, where students and faculty think of each other as occupying different, often conflicting, territories," the idea of collaboration may seem like "treason" (p. 2). In a related emphasis on such complexities, Leitch explains that "[d]uring the 1970s, the rise of interdisciplines as well as of theory initially felt like an explosion more than a consolidation," which serves as a reminder of the need for "reflection" (qtd. in Ruiz 2005), for looking closely before expanding our view to the broad or the global. Meyer's notion of interdisciplinarity as a broadening of frames is challenged by this attention to the particulars. The taking apart, which is arguably a requirement of interdisciplinary studies, is an undoing that some would perceive as antithetical to a "consolidation"; however, in Klein's work (2005), there is a clear format presented wherein the consolidation begins to take shape but only through rigorous inquiry. Through practice (and scholarship) dependent upon a flow that requires continual inquiry, the usefulness of interdisciplinarity becomes evident; however, these results are not fixed, not left outside the realm of further questioning. Leitch provides a kind of mini-oasis for one who is interested in such engaged interdisciplinarity. His comment that it is "not unusual for someone in geography or architecture, for example, to show up in [his] class or office" introduces the connection between "theory" and the idea of "a rhizomatous deterritorialized profile" (qtd. in Ruiz 2005, p. 6), as discussed by Deleuze and Guattari (1980). Leitch's work encourages a subversive, postmodern, rhizomatic approach to better understanding the term "interdisciplinarity".

This may seem counter-intuitive, if not treasonous (in Gamson's frame) in terms of both content and approach. TESC has increasingly adopted programs – and created others—that value collaboration not only among students and across student/faculty lines but also that bridge

community concerns. Service learning and field studies, both of which require non-traditional learning methods, can often provide a way of breaking the proverbial ice between teacher and student. In addition, such work depends on geography, on place. Whether this is urban, suburban, rural, or wild terrain, the liaisons between institution and community remain vital. Collaborative work "in place" draws individuals to a common ground, quite literally, and uses a variety of skills and techniques to provide students and faculty alike with more options for successful participation. These strategies are reminiscent of Meyer's emphasis on "local contingencies" and Schoenberger's attention to geography. Field studies can provide access to the "natural world" or what I prefer to call the other-than-human, since human structures, even those that pollute and destroy, are also natural. These relationships between and among human and other-than-human systems serve an ethical purpose deeply grounded in the local yet carrying global resonances.

Schoenberger and Meyer introduce aspects of land use, ecosystem dynamics, and human reliance on systems that require collaborative relationships. Those who consider the value of interdisciplinary studies through the ongoing concerns for social justice are engaging in similar processes. There is a paradox within this definition that is particularly useful: within limits (that is, local contingencies, specific geographies) abundant freedom of inquiry is possible. Relationships can emerge from a variety of places and possibilities, but everything is connected. This, in some ways, is the whole point of interdisciplinarity. While Reams placed his emphasis on connection in the spiritual realm, this attempt toward definition emphasizes the "thing itself," [1] the project at hand. The self—as well as the project, the work, the practice of engagement with that which "belongs to no one" (Barthes, qtd. in Parker and Samantrai 2010, p. 14) but can potentially benefit many— is where interdisciplinarity begins.

Gamson argues that "[n]owhere are good theories needed more than in education" and prescribes a challenge to existing power relations in classroom settings and beyond. Her narrative-inspired essay, "Collaborative Learning Comes of Age," not only advocates for "changes in authority relations between students and teacher" but, equally importantly, "between students and knowledge" (1994, p. 3). She encourages the practice of seeking out the "theoretical clues to the way" such change occurs and credits collaborative learning with such effective innovations. At the same time, Gamson suggests that these "[e]ducational innovations are notoriously short-lived and cyclical. There are many reasons for this, not the least of which is the lack of grounding of educational practices in theories that might help explain why they work and don't work, how their effects carry over into other settings, and how they might be adapted to new populations and situations" (1994, p. 5). She points to TESC and the Washington Center as "extraordinary" examples of institutions that have created sustainable programs as a result of continual assessments and further innovations. Central to her essay is a call for three issues to be more fully and continually addressed within the realm of higher education: a "Need for More Theory," as well as an "Increase [in] the Institutional Impact of Collaboration" and finally an effort to "Enhance Democracy" in the classroom, on the campus, and in the lives of the collaborators outside such boundaries of education. Thus, the notion of never "resting on" one's proverbial "laurels" implicit in Smith and McCann's attention to "reinventing" is that which Gamson advocates in her continual emphasis on theory in collaboration with practice.

A 2010 article by William Newell points to a "series of best practices related to the construction of a more comprehensive understanding [of interdisciplinarity]." He asserts this some twenty

years after his initial advocacy for collaborative learning, creating a list that is reminiscent of the very practices TESC seeks to employ:

- Assume every perspective that has stood the test of time has a kernel of truth to it.
- Embrace contradiction, asking in what sense a situation can be "both."
- Engage in shuttle diplomacy, going back and forth between theories, and between theory and empirical evidence.
- Seek an understanding that is responsive to each of the contributing perspectives but not dominated by any one of them.

The democratic aspect, valued by Gamson and others, is evident in the "shuttle[ing] diplomacy" in a multi-vocal seminar-based environment. The notion that a single "perspective [is] not dominat[ing]" provides for a more democratic approach to learning. The perception of "a kernel of truth" as evident in that which has "stood the test of time" is a practice that also recognizes contingency. That which is time-worn is not therefore fixed, permanent, but rather a useful point of reference for further theorizing. Newell advocates a kind of "shuttling back and forth" between interdisciplinary studies, and he argues that "interdisciplinary courses need the disciplines for depth and disciplinary courses need interdisciplinarity for real-world applicability." This is an emphasis he supported in 1983 and reiterates some sixteen years later. What Newell unveils as something he "only recently" has "come to realize [is] that students also need to shuttle back and forth between the classroom and the outside world" (2010, p.11). He concludes by asserting that "interdisciplinary studies and integrative learning can achieve their full potential only if they are conceived in a way that values diversity of perspective, demands integration of insights, and embraces holistic as well as reductionist thinking." His final line is a definitive call for such programs: "Only then are students prepared to meet the challenge of coping with complexity" (Newell 2010, p. 11).

Parker and Samantrai point to institutionalized definitions of interdisciplinarity as antithetical to the "social movements" that led to such inquiry. Further, they critique Klein's work in its attempts to "synthesize existing disciplinary concepts" toward creating "a unity of knowledge for a non-specialized general education" (2010, p. 3). For Klein, interdisciplinary work requires integration. For Newell, such work also requires the flexibility to move outside the classroom – into the social scientific and the natural science worlds from which complex learning can be engaged. TESC, through assessment-based inquiry into its own programs, relies upon such engagement within and beyond the classroom, pursuing an engaged and sustainable set of interdisciplinary practices. Parker and Samantrai draw specifically on "social justice" concerns and outline the vital relationships between such "studies" in the academy and social movements that gave rise to such innovations in education. TESC requires students to create the projects that come to define the major they create. One example of such a study is described by a student who transferred to Evergreen from Wooster College in Ohio.

A focus on Spanish and political science led her to apply for the "Semester in Venezuela" program at Evergreen. After a season of vigilant social justice practices including voluntary work at a local market, she returned to her home state of Washington. Professors encouraged her to follow this intensely practice-based learning with another semester of field studies, but this one quite distinct from her engagement abroad. She served as a legislative intern, while working

closely with her professors in Spanish language studies and in political science. TESC is located in Olympia, the state capitol, so this proximity to college resources was also useful. During her tenure as an intern, the student worked in a bilingual school as a volunteer. Currently, this graduate of TESC teaches in Houston, Texas, in the Teach for America Program. Having tested as a "fluent" speaker, she has taught in Spanish-speaking kindergarten and fourth grade classes. Interdisciplinary approaches to teaching continue to be central to her work as an educator, even among the youngest school-age children.

Another student left TESC with a degree in natural sciences and worked as a manager in a local organic farm until he began graduate studies in agricultural design. Each student creates his/her major through interdisciplinary approaches and follow-through; this is but one example of an institution engaged in the practice of dynamic and fluid re-definition that appears to embody what Barthes called "creating something new" (qtd in Parker and Samantrai 2010). When devoid of a *mindful* framework, scholarly discourse (even if it attempts interdisciplinary angles) runs the risk of providing the foundation for yet another meta-narrative. Mindfulness, in the Evergreen State College environment, does not reside solely in the mind. Field studies and service learning remain crucial to the interdisciplinary scholarship and practice. Mindfulness is dependent upon scholarship as well as practice, both requiring the rigor necessary to sustain interdisciplinary studies. Smith employs a mindful approach to continual assessment of TESC and its programs supported through the Washington Center.

Jean MacGregor, who co-founded the Washington Center (with Smith), argues that "[k]nowledge is shaped, over time, by successive conversations, and by ever-changing social and political environments"(qtd. in Minkler 2002, p. 46). A biologist by training, MacGregor understands the value of interconnected life systems and ecological complexities. Through grants from various funding sources, she created the Curriculum for the Bioregions Initiative. One goal of this initiative is to provide faculty within community colleges and four-year institutions with opportunities to collaborate toward creating individual assignments or entire syllabi focused on bioregional challenges and sustainable practices. The faculty LCs began as disciplinary seminars; for example, English composition faculty met during one retreat and chemistry faculty during another. The focus on the bioregion provided for a thematic engagement of place, which led to complex, cooperative projects in the various disciplines. A further goal is for the members of the faculty LCs to combine their strengths in courses that bridge two or more disciplines. MacGregor continues to develop and shape the initiative as she provides opportunities for collaborative assessment and thoughtful, rigorous feedback as part of the participation requirements.

The Mission of the Curriculum for the Bioregion Initiative includes an explicit emphasis on "engag[ing] faculty in embedding sustainability concepts and place-based learning in a wide array of undergraduate courses" (http://www.bioregion.evergreen.edu). The process, dependent upon faculty learning communities, includes both the revamping or reimagining of existing courses and the creation of new courses "that involve students with the issues facing the bioregion and with those people and organizations working on solutions" (http://bioregion.evergreen.edu). MacGregor describes her inspiration for the initiative as a "tugging on her sleeve" that was persistent through the latter years of her work as a faculty member in the Masters Program in Environmental Studies in TESC. Her perception was that the research, scholarship, and interdisciplinary practices were an exception to the status quo at other

colleges and universities; the students were committed and engaged, but all those involved seemed to be moving toward a future that was changing so rapidly that there was a profound disconnection. MacGregor was determined to create an environment in which researchers, scholars and practitioners would return their focus to place, to the geographies and climates and human influences that were their homes or temporary locales (Personal Communication 2 November 2012).

The emphasis is on approach as process, or as active consideration, in a move toward sustainable practices. In this model, central to TESC, the notion of "ethics" remains in a state of flux, of change, continually informed by collaborative reflection, by inquiry. Concerns of social justice are dependent upon such ethical reflection. MacGregor's Bioregions Initiative provides a unique example of such ethical and interdisciplinary tenets because the attention is so particular to place. At the same time, this is a *place* shared by many stakeholders, many diverse communities of people, and abundant industry. A grounded attention to social justice/social change is a core focus of the Bioregions work, through indigenous perspectives, which is a return to the founding years of TESC.

From its earliest days, TESC valued "strategic partnerships," with a commitment to bridging theory and practice. The first decade included collaboration between the institution and K-12 leaders as well as Native American tribes (Smith 2001, p. 77). From the wisdom and practices embodied in Evergreen's model, the Washington Center for Improving the Quality of Undergraduate Education was founded "[i]n 1985, with support from the Exxon Foundation and the Ford Foundation"(pp. 78-9). As a unique statewide public service initiative the Center provided Evergreen with "an explicit statewide leadership role in reforming undergraduate education" (p. 80). Creating and supporting the learning community courses remains a central goal of for the Center. Smith explains that "the Center has also attracted major funding for statewide projects in such areas as calculus reform, cultural pluralism, and interdisciplinary approaches to the sciences" (p. 80). The impact of the Washington Center on the development of interdisciplinary studies through developing programs to support learning community education cannot be understood without also understanding that "the Center acts as a statewide support system for educational reform and sponsors a variety of activities including faculty exchanges, conferences and retreats, assessment initiatives, and technical resources (Smith 2001, p. 80).

In the early years, "Evergreen, like many new institutions, was focused inward, preoccupied with the challenges of creating an identity and surviving the turbulent wars and changing expectations of state government and a fickle public" (Smith 2001, p. 80). Smith emphasizes the idea that being placed under the proverbial microscope has required TESC to remain attentive to its continual development and reassessment of teaching and learning. In the environment of new faculty and students whose needs and interests continue to shape the institution, "the academic practices that had vitality in earlier times need to be reborn and revitalized or they will atrophy or become tiresome bureaucratic requirements" (p. 82). Rather than a negative, such change is seen as a "challenge" with the goal "to maintain continuity with core values, and to maintain a sense of rooted identity and vitality in the race of critical transitions" (p. 82).

In the context of TESC, the authority held by faculty is important, though always contingent upon relationships. In the context of collaborative learning, such authority is strongest and higher

levels of learning can be accessed when students engage in questions/ research/discussion/dialogue *with* their professors and with the geographical and social environments they inhabit. A simple practice utilized by a number of faculty members who teach LC courses presents a visual example of this reliance on a multi-vocal, collaborative approach. The following exercise is also a useful tool for preventing the single-student-monologue that can lead to the silencing of a quiet or shy student in the classroom setting. It all begins with a skein of yarn.

Faculty members explain that when someone has the proverbial "floor," that person must hold the yarn. When the next person raises a hand to speak, the ball of yarn is tossed to—or handed to—that person. The passing of the skein creates a visual web, as the previous speakers hold their place in the movement, and if two people began to speak back and forth, which rarely happens, the faculty member could encourage movement of the yarn to the margins, the un-voiced areas of the circle. And on to the next speaker, and so on the yarn moves across the circle in sometimes unexpected lines. At the end of the seminar, the text that has been discussed can be placed atop the web of yarn. Then participants can quite literally lift the text, which creates yet another image: a group-engendered realization of bringing the work to another level, one of higher understanding. Such a simple practice is also a return to Gamson's challenge to single "authorship," for the response to the text can become more poignant in this polyphonic engagement.

The founding principles of TESC contained a vision of collaboration as not simply residing in the relationship of student to faculty but also student to student and faculty to administrators. In this framework, Gamson's emphasis on "changes in authority relations" requires an active, dynamic set of engaged relationships whereby "collaborative learning leads to changes" and these occur not only "in authority relations between students and teacher" but also "between students and knowledge" (1994, p 5). Gamson asserts the importance of "social psychological studies of socialization to subordinate roles" and how our understanding of the ways in which "higher education reinforces or challenges such socialization [becomes a] fruitful approach" to developing knowledge. Here she emphasizes the "social constructivists," pointing to "Richard Rorty's gloss on John Dewey in *Philosophy and the Mirror of Nature* (1979) and his subsequent writings [which] analyze the social basis for warrants about what constitutes knowledge" (p. 4). Gamson argues that "[s]ocial constructivists in anthropology, sociology, and literature might help us account for how collaborative learning helps students see that knowledge is not a fixed, immutable substance" (p. 5).

This image of a skein of yarn used in a seminar provides the context for better understanding the dialogue between theory and practice at TESC, and through the programs and institutes it has engendered. Chapter Five of *Reinventing Ourselves* is co-authored by five individuals, some faculty and others staff and administration for the Center, another example of intentional collaboration. "Bridging Theory and Practice: Public Service at The Evergreen State College" investigates the history of the way in which "public service centers" have been intentionally supported by the college in order to "create a reciprocal relationship between the wider community and Evergreen, providing a forum to enrich and broaden the exchange of knowledge in an ever-widening circle (2001, p. 91). Although "service learning" has become a familiar phrase and many institutions across the country have embraced such interdisciplinary approaches

to student participation, the history of TESC and its commitment to service places attention on what Costantino, Decker, Elliott, Kuckkahn, and Lee consider "a necessary dimension of alternative liberal arts education" (qtd. in Smith and McCann 2001, p. 93). Such a reading would see the "interdisciplinary academic programs at the college [as] the trunk of a tree [and] the public service centers [. . .] evolving as the roots" (p. 93). This may seem a very curious image, a metaphor that perhaps subverts the power of the college in some manner. For if the roots of the programs are generated elsewhere, how then does such an enterprise or institution maintain control? Roots, after all, are rhizomatic, moving in many directions at once. This emphasis on valuing relationships and engaging complex, sometimes unanswerable questions, however, provided the foundation for the college. Programs, initiatives and institutes are further manifestations, branches perhaps, or even seedlings growing their own trunks, but the roots remain dependent on the larger scope of geography, place, culture within which the academy resides.

This brief study began with an emphasis on "reinventing" ourselves through collaborative learning and concludes with an engagement of place, of the other-than-human relationships that shape and are shaped by human activities. TESC, in over forty years of experimental learning and consistent attention to assessment, finds itself –in some manner of speaking—right back where it started: paying close attention to collaborative learning and interdisciplinary educational programs. The college has both advanced and adapted. Through collaborative leadership methods, TESC has not only become a model for other educational institutions but also a force for the creation of programs, institutes and initiatives. Thus we return to Schoenberger and to Barthes, noting that as we "*create* the interdisciplinary projects and take them out into the world" (380), we are again commencing rather than completing the processes. The work continues—shaped by the faculty, students and administrators—through the re-imagining of that which precedes us and also what is to come.

Notes

[1] As in Wallace Stevens' attention to the image, that poetry must be concerned "not with ideas about the thing but the thing itself."

References

Deleuze, Gilles and Félix Guattari. (1980) “Introduction: Rhizome.” In *A Thousand Plateaus: Capitalism and Schizophrenia. T*rans, Brian Massumi. Minneapolis: University of Minneapolis Press, 1987 [1980].3-25.

Gamson, Zelda F. (1994). "Collaborative Learning Comes Of Age." *Change* 26.5: 44. *Education Research Complete,* Web. 28 Oct. 2012.

Holley, Karri. (2009). “Interdisciplinary Strategies as Transformative Change in Higher Education.” *Innovation in Higher Education*, 34:331.

Klein, Julie Thompson. (2005). *Humanities, culture, and interdisciplinarity: The changing American academy*. SUNY Press.

Meyer, Morgan. (2007). “Increasing the Frame: Interdisciplinarity, Transdisciplinarity, and Representativity.” *Interdisciplinary Science Reviews*, 32.3: 203-12.

Minkler, James E. (2002)."ERIC Review: Learning Communities at the Community College." *Community College Review*, 30.3: 46.

Newell, William H. (2010). "Educating for a Complex World." *Liberal Education*, 96.4: 6-11. *ProQuest Research Library*.

Parker, Joe and Ranu Samantrai. (2010). *Interdisciplinarity and Social Justice: Revisioning Academic Accountability*. Albany: SUNY Press.

Reams, Jonathan. (2005)."What is Integral About Leadership?: A Reflection on Leadership and Integral Theory.” *Integral Review*, 11:18-32.

Romer, Karen T. and William R. Whipple. “Collaboration across the Power Lines.” College Teaching, 1991.

Ruiz, Nicholas. "Theory, Interdisciplinarity, and the Humanities Today: Interview with Vincent B. Leitch." (2005). *InterCulture*, 2.3.

Schoenberger, Erica. “Interdisciplinarity and Social Power.” (2001). *Progress in Human Geography*, 25.3: 365-82.

Smith, Barbara Leigh. "Learning Communities and Liberal Education." *Academe*, 89.1 (2003): 14-8. *ProQuest Research Library*.

Smith, Barbara Leigh, and Jean MacGregor. "Learning Communities and the Quest for Quality." *Quality Assurance in Education*, 17.2 (2009): 118-39. *ProQuest Research Library*.

Smith, Barbara Leigh and John McCann, eds. (2001). *Reinventing Ourselves: Interdisciplinary Education, Collaborative Learning, and Experimentation in Higher Education*. Bolton, MASS. Anker Publishing.

Learning Globalization from the Beatles

BRIAN CULVER
New York University

My title, "Learning Globalization from the Beatles," references one of the first essays about the Beatles by a professional academic, Richard Poirier's "Learning from the Beatles" (1967). I reference it because Poirier argues that the Beatles teach us both how culture needs to be redefined and how disciplines that take culture as their object of study can be reformed. Moreover, Poirier's analysis of the Beatles' song "All You Need Is Love" contains prescient hints of this song's role in the history of contemporary globalization. [1] Consequently, in my essay I would like to expand upon Poirier's by arguing that the Beatles' "All You Need Is Love" not only was shaped by geopolitical forces of globalization, but also globalization comments on them. "All You Need Is Love" can teach us how to teach globalization.

"All You Need Is Love" was first performed on June 25th 1967 to an estimated audience of a half billion people as part of the first global live satellite television broadcast, "Our World." The importance of the "Our World" broadcast in the history of globalization was exhaustively documented a decade ago by the media scholar Lisa Parks in her essay "*Our World*, Satellite Televisuality, and the Fantasy of Global Presence." Although "Our World" was not the first satellite broadcast, it was the first conceived with a deliberate global reach (Parks 74). Unsurprisingly given Marshall McLuhan's prominent role in the program's introductory segment, "Our World" presented itself as heralding the utopianist promise of the "global village," one that renders "our world" one world, "interpellating the viewer not only as 'globally present' but as 'culturally worldly' and 'geographically mobile'" (Parks 75). But, as Parks shows, this utopianist promise scarcely hides the program's neocolonialist ideology. "Our World" 's self-proclaimed "liveness" is a discourse of Western modernization, one that widens the economic and political disparities between the Global North and Global South.

The conclusion of the broadcast's penultimate segment features the Beatles recording "All You Need Is Love" in the Abbey Road studios. Situating this song in the context of the "Our World" broadcast, and this broadcast in the history of contemporary globalization, implicates "All You Need Is Love" in what Doreen Massey has called the inevitable "power geometry" (194) of neoliberal capitalist globalization. Moreover, this song's place in the popular imagination as the hippie anthem for the "Summer of Love" seems to make it an affirmation of the utopianist promise of the "global village." But does "All You Need Is Love" actually make any such affirmation? Let's begin with the verbal ambiguity of the song's title and refrain. Does it assert, as is commonly assumed, that love is the only thing ever needed, or that love is the one thing still needed? The refrain's inversion in the song's coda, "love is all you need," puts the emphasis not on love but its need. Perhaps then love is the one thing still needed because it is a need that can never be met. This is precisely Richard Poirier's reading; he adds that the song's verses confirm this interpretation of its title. The three verses proceed through a series of the word "nothing" seven times, the first verse beginning "There's nothing you can do that can't be done,/Nothing you can sing that can't be sung." The lyrics in fact lament the loss of any new possible makings.

The musicologist Wilfred Mellers contends that the song is not celebratory but "infinitely sad" (103).

The song's musical features underscore these ambiguities. The song is in the key of G major, traditionally the most cheerful of keys, but the voice leading produces an E minor chord on the last word of the first two lines of each verse – for example, on the words "done" and "sung" in the first verse (Everett 124). Each verse ends with the phrase "It's easy," but the word "easy" is set to an *appoggiatura* (a dissonant note quickly added and then resolved, like a musical sigh), implying that it's not so easy after all. The song is most formally ambitious in its coda, comprising a string of musical quotations that includes a two-part invention by J.S. Bach, the opening riff of Glenn Miller's 1939 hit "In the Mood," the Renaissance ballad "Greensleeves," and two self-quotations, the Beatles' own songs "Yesterday" and "She Loves You." The recurrent need for love is situated in the history of music about its need. That love is a need that can never be met – that we have never had love and so perhaps never shall - is proclaimed by the recurrence of songs about it. When we attend to its verbal and musical subtleties, we see "All You Need Is Love" is revealed as highly skeptical of any kind of utopia promised by any kind of new world order.

But "All You Need Is Love" is neither cynical nor wholly satirical. In "Learning from the Beatles" Richard Poirier also contends that when the Beatles are allusive they expand a "situation to the simultaneous condition of pathos, because the situation is recurrent and therefore possibly insoluble, and comic, because the recurrence has finally passed into cliché" (120). If the Beatles are skeptical of the promise held out by the new "global village," they are equally skeptical of rhetoric that simply dismisses it. When I shared some of my ideas in this paper with a joint group of students and faculty, one of my colleagues remarked that in the song's musically allusive coda she could hear nothing but chaos. I replied that her ear might be recoiling from the song's polytonality when "Greensleeves" is quoted. Both the Bach and Glenn Miller quotations are transposed from their original keys to the song's cheerful key of G. Not so with "Greensleeves," which is left in its original Dorian mode and so, strictly speaking, is in no key at all. Musicologist Alan Pollock compares the polytonality used here to that often used by the composer Charles Ives, for whom polytonality is not chaos but energy and excitement. "All You Need Is Love" is no naïve hippie love-anthem, but neither is it, contrary to Meller's suggestion, "infinitely sad."

We still need to consider how "All You Need Is Love" comments on what Lisa Parks calls "Our World" 's fantasy of "global presence" which imposes neocolonialism. For Parks, this fantasy is maintained by the program's insistence on its "liveness." But this insistence is contradicted by what we witness the Beatles doing "live," which is making a recording. Indeed, during much of the Beatles' televised segment the mediating presence of the recording studio is highlighted. We often view the Beatles through the window of the recording studio's control room. The BBC announcer often explains that what we are hearing is not, in fact, "live." "There's several days work on that tape," he declares at one point.

Of course, these "canned" moments equally point up that what the Beatles are making is not just a recording but a commodity, that their efforts are situated within the global marketplace of neoliberal capitalism, one that is decidedly dominated by the modern system of Western nation-

states controlling the very broadcast we are viewing. Each of those nation-states participating in the "Our World" broadcast chose a "representative" to showcase its contribution to "world culture." The Beatles were chosen by the BBC (not without controversy) as Great Britain's "representative." But here too ironies proliferate. "All You Need Is Love" is introduced by the opening of the French national anthem, "La Marseilles." Moreover, the bass part quotes the opening three notes of "La Marseilles" at the end of every line of the verse. Is this recurrent presence of the French national anthem intended as a joke directed at the choice of the Beatles as Great Britain's representative, or a more general mockery of nationalist pride, or a still more general mockery of musical anthems of any kind? (Or all three?) Although the song begins with a nod to the French, it does conclude with the quintessential Englishness of "Greensleeves." But then what are we to make of the jarring polytonality it creates? The song's most transnational characteristic inheres in its most often remarked upon musical for – it's shifting meter. The melodic structure of most pop songs is eight measures of four beats each. Each verse of "All You Need Is Love" is likewise eight measures, but it shifts between four and three beats for six of its eight bars. Such a metrical scheme closely resembles that of a *tala* in Indian *raga*. That the Beatles were influenced by Indian music (years before their trip to India) is well known. Musical scholarship is only recently, however, beginning to show how much of the Beatles' metrical innovations were also driven by such influence. So even before it was part of a global television broadcast, "All You Need Is Love" was already the product of globalization.

So what can we learn about globalization from the Beatles? Let me preface my answer with a few assertions about globalization, to most of which I suspect we can all readily assent. First, globalization is a multi-dimensional process or set of processes. That is, globalization takes place in all of the social domains – the economic, the political, and the cultural. Second, while the social domains have always been interdependent, they are made even more so by globalization. Third, although increasingly interdependent with one another, no social domain has causal priority. [2] To these three I would like to add a fourth assertion to which we might not so readily assent: while interdependent with one another, the social domains are also incommensurate. By "incommensurate" I do not mean "autonomous." In its sense of self-governing, "autonomy" obtains in only one social domain, the political. Consequently, "autonomy" is precisely the kind of term that the incommensurateness of the social domains disavows. If no social domain has causal priority, then we cannot describe globalization in any one social domain using standards of measurement appropriated from the others. Furthermore, insistence upon the incommensurateness of the social domains has major implications for both the teaching and research of globalization, especially as it addresses three of the thorniest issues of global studies: power, agency, and disciplinarity. Time permits me to address only the third of these.

With the theme of interdisciplinarity in mind, let's return to Richard Poirier on the Beatles:

> The Beatles are primarily musicians and musical composers . . . and don't choose to get stuck even within their most intricate verbal contrivances . . . [U]ses of words that allude both to the subject of the moment and to their constant subject, musical creation, occur in "All You Need Is Love" ("Nothing you can sing that can't be sung") . . . "All You Need Is Love" is decisive evidence that when the Beatles think together (or apart) about anything they think musically and that musical thinking dictates their response to other things . . . (126-28).

I hope that the foregoing analysis of "All You Need Is Love" shows that the song does, in fact, engage with the issues of globalization entailed by its global context. But it is not this context that discloses its meaning. It is, rather, the context of music-making that situates the song's engagement with globalization. Per my claim of the incommensurateness of the social domains, globalization manifests itself in this song as a relation between it and other music – including other music by the Beatles themselves. The simultaneous interdependency and incommensurateness of the social domains requires not more interdisciplinarity but more disciplinarity. [3] Lest I be thought to contradict the very premise of the conference for which this paper was originally conceived, let me add that by "more" disciplinarity I mean two things. While I do mean more work on globalization done within the confines of the individual disciplines, I also mean more disciplines working on globalization. What's needed is not a referendum on the relevance of disciplinarity to a full account of globalization, but an increasingly greater number of disciplines producing increasingly more diverse accounts of globalization. What is needed, in short, is more occasions like the one that has just finished . . . now.

Notes

[1] "Learning from the Beatles" was first published in *The Partisan Review* in December of 1967 (and so scarcely six months after the release of "All You Need Is Love"), then reprinted (with minor revisions) in Poirier's essay-collection *The Performing Self* in 1971. The essay's re-situation in this collection especially foregrounds its argument about disciplinary reform.

[2] That these three assertions are uncontroversial I deduce from their recurrent presence in introductions to global studies, such as (to cite only a couple of the most recent ones) Manfred B. Steger's introductory essay to *Globalization, The Greatest Hits* (2010) and Frank J. Lechner's and John Boli's to *The Globalization Reader* (2011).

[3] In their essay "Discipline and Freedom," Amanda Anderson and Joseph Valente argue that "current celebrations of interdisciplinarity often harbor within them a deep – yet insufficiently examined distrust" of what both does and does not constitute an academic discipline. They further demonstrate how historicizing modern disciplinary formation reveals that interdisciplinarity was always "at the heart of disciplinarity itself" (2).

References

Anderson, Amanda and Joseph Valente. "Discipline and Freedom." *Disciplinarity at the Fin de Siècle*. Princeton University Press, 2002: pp. 1-15.

Everett, Walter. *The Beatles as Musicians:* Revolver *through the* Anthology. Oxford University Press, 1999.

Lechner, Frank J. and John Boli, eds. *The Globalization Reader*, fourth edition. Wiley-Blackwell, 2011.

Massey, Doreen. *Space, Place and Gender*. Polity Press, 1994.

Mellers, Wilfred. *The Twilight of the Gods: the Music of the Beatles*. Schirmer Books, 1973.

Parks, Lisa. "*Our World*, Satellite Televisuality, and the Fantasy of Global Presence." *Global TV: A Global Television Reader*, ed. Lisa Parks and Shanti Kumar. New York University Press, 2003, pp. 74-93.

Poirier, Richard. "Learning from the Beatles." *The Performing Self*. Rutgers University Press, 1971: pp. 112-40.

Pollock, Alan W. Notes on "All You Need Is Love," #118. http://www.recmusicbeatles.com/public/files/awp/aynil.html. 1996.

Steger, Manfred B., ed. *Globalization, The Greatest Hits: A Global Studies Reader*. Paradigm Publishers, 2010.

Supercool Art: Drawing with Liquid Nitrogen in Provincetown

DAN JAY
Tufts University School of Medicine

Photos by Charlie Rosenberg/www.tecnet.org
Videos by Laura Wong /www.artinsilico.com

Art and science: separate and distinct

Our society in general and academia especially has segregated art and science. Increasing specialization had made it difficult and seemingly undesirable for faculty to focus on disparate areas. This was not always so. In the 19th century, Alexander Borodin was a chemist and composer, and Thomas Huxley worked as a biologist and humanist. Later, Alfred North Whitehead and Bertrand Russell were what we would consider polymaths. And yet, despite the contributions of these notable men, the late 20th and early 21st centuries appear to have encouraged specialization and academic isolation. No doubt there are institutional reasons why this is so, but lately I have begun to ponder why I – a man who has a strong passion for science and art – has only recently sought to combine the two. Furthermore, I have begun to ponder the reciprocal nature of art and science.

I have always been interested and encouraged in art and science, but I have not always recognized how the two could benefit and inform one another. In the mid-1980's I was elected a junior fellow of the Harvard Society of Fellows to work on science and art. During that time, I developed a novel laser-mediated technique for the destruction of specific proteins in cells to address their cellular function [1]. This approach, called CALI (Chromophore-Assisted Light Inactivation), has been used by my lab and others to understand the molecular mechanisms of embryonic and neural development as well as cancer invasion [2]. As a junior fellow, I was concurrently provided with an art studio where I painted at night and where I generated artwork resulting in two solo exhibitions. I also had the privilege then of studying drawing with the sculptor Will Riemann, who remains my mentor today. Although in the decades that followed I continued to make art and to practice science, I deliberately kept the two disciplines in separate silos. Art was art and science was science. I'm not sure why I did this, but perhaps I felt using my scientific knowledge would trivialize my efforts in visual art and make the latter somehow less pure. Perhaps I was keenly aware that scientists who are not completely driven in their areas of focus are not taken seriously, and that artists who come from other career paths are thought dilettantes or worse, hobbyists.

If I am not completely positive why I kept my twin passions separate for so long, I'm equally unclear about exactly when this changed. I do know, however, that at a certain point, I realized there were academics and others involved in cross-disciplinary thinking. I began to wonder if it was possible for me to combine my interest in art and my work as a scientist. Around the same time, I began to seek out venues where I might somehow combine the two. That is how I found myself last summer at the Fine Arts Work Center (FAWC) in Provincetown, MA. I had a feeling I might find kindred souls at the FAWC, but what I didn't count on was how much the history of

the Center and the town where it was located would teach me about interdisciplinary work and how art itself has always been bound up with other fields.

Provincetown: A history of interdisciplinary practice and a model of bringing art and science together

In the summer of 2013 I attended a workshop on Discovering Drawing led by Paul Stopforth at the Fine Arts Work Center (FAWC) in Provincetown. The FAWC has been a haven of interdisciplinary thought and action since its inception in 1968; it was founded by visual artists Robert Motherwell, Jack Tworkov and Fritz Bultman as well as writers such as the poet Stanley Kunitz among others [3]. These founders believed in the power of interaction between fields. In addition to being one of the great painters of the New York School, a term he coined, Motherwell had attended graduate school in philosophy and loved literature.

The interdisciplinary spirit imbued by these founders is still alive here at this art colony. While focused on developing emerging artists within their disciplines, the interaction between FAWC teachers (*i.e.* established artists) and students is fostered and promoted between disciplines. At FAWC summer workshops bring together visual artists and writers, and attendees participate in evening poetry readings, visual art presentations and panel discussions. In addition to the support of Stopforth and my fellow attendees, discussions with poets and printmakers from concurrent workshops impacted my work there. The Discovering Drawing workshop that I attended was designed to push students towards a diverse definition of drawing.

The FAWC and Provincetown have a long history of appreciating such diversity making art. Provincetown holds a special place in the history of art as an artist colony throughout the 20th century but especially during the birth of abstract expressionism (Ab Ex) in the late 1940s and 1950s [4]. This style of painting also called the New York School focuses on process and not product in which dynamic push and pull on the canvas is the predominant objective and indeed the subject of the painting [5]. Its proponents included Jackson Pollock, Lee Krasner, Adolph Gottlieb, Willem de Kooning, William Baziotes, Arshile Gorky, Franz Kline, Hans Hofmann, Barnett Newman, Mark Rothko, Helen Frankenthaler, as well as FAWC founders Bultman, Tworkov and Motherwell [6]. They all summered in Provincetown and some like Hofmann, Motherwell, Bultman and Tworkov were an integral part of the art colony yearly [7]. Hofmann for example founded his School of Fine Arts here, which influenced many artists including Krasner, Bultman and Frankenthaler [8].

While many of the Ab Ex artists were influenced by Europe (early Pollock, Gorky and de Kooning works are in the style of Picasso-like synthetic cubism [9]), it was the freedom of post-war New York and Provincetown (during summers) that provided the environment for creative courage. In his seminal book The Triumph of American Painting, Sandler argued convincingly that Ab Ex was fostered by a sense of community in New York; people showed at the same galleries (*e.g.* Art of this Century, Koontz, Egan, Parsons Galleries), listened to formal discussions and lectures at the Eighth Street Club, and engaged in informal chats at the Cedar Street Tavern [10]. I think it important to point out that for many of these artists the summers in Provincetown were also critical opportunities to develop a community and define a group ethos. Gottlieb said "When you are a young artist, Provincetown is the place to be . . . " [11]. While

Motherwell stated, “New York and Provincetown, in a way that no outsider can understand, freed us both in our different manner. In both places there is the personnel and options that make it possible to be oneself without isolation of the sense of a vacuum.” [12] In Provincetown artists shared living and studio space; lectures on contemporary art were given (by Hofmann, Gottlieb, Bultman and others [18], including Motherwell’s talk at Forum 49 that introduced the term “New York School” [13]. The comingling of artists in the summer air provided an environment that fostered shared innovation.

The same is true in science. Within my general field of molecular biology I have found how important it is to commune at places like Cold Spring Harbor Laboratories and Woods Hole Marine Biological Labs. Summer courses and lectures provide interface between scientists who work in different areas and sometimes find common ground in formal talks but more often make connections as they linger over dinner or at the beach. This informal atmosphere helps free creativity to exploit the common ground that arises. Matt Meselson (one of my teachers and an eventual colleague) and Frank Stahl met at Woods Hole and within a few years would together perform what molecular biologist John Cairns called “the most elegant experiment in biology”, which showed how DNA replicates [14]. Summers at Cold Spring Harbor were critical for the founding of molecular biology. James Watson, of double helix fame, once said of Cold Spring Harbor: “I think during the summers well it’s the most interesting place in the world, if you’re interested in biology” [15]. My own work was influenced by my attendance as a student and lecturer at these summer havens. For example, I first publicly presented the CALI innovation described above as a student at the Neural Development course at Cold Spring Harbor in 1985 when this technology was only an idea and a full three years before its publication.

I speculate the same sense of belonging, camaraderie, and even competition that benefit scientists at sites like Cold Spring Harbor benefit artists in places like the MacDowell Colony, Monhegan Island and especially Provincetown. I know artists in these places share ideas. Motherwell recalls his first visit to Provincetown in 1942 and speaks to the influence of the surrealist artist Max Ernst on him and others:

“Before Ernst was removed, I remember watching him in his studio, making automatic paintings on the floor, with a paint bucket wired six feet from the ceiling with a small hole in the bottom dripping black paint in the canvas beneath, in splattered arcs, varying according to how widely and in what direction he swung the paint bucket hanging on its wire, a procedure far more limited mechanically in its rhythmic possibilities than Jackson Pollock’s dance drips of the same period.” [16]

Ab Ex artists emphasized novel ways of applying paint to create the dynamism that was at this movement’s core. Motherwell, Tworkov and others used the automatic painting of Ernst and Matta to tap into the subconscious, an integral strategy for Ab Ex. Rothko was an early user of acrylic resins. Helen Frankenthaler (once married to Motherwell and a frequent Provincetown visitor) would apply poured paint in wide arcs on unprimed canvas to achieve her “stain paintings” [17]. Most famously, Jackson Pollock would drip paint to create action paintings reworking over any area of the canvas that looked too representational. Thus, novel ways of making marks and dynamic patterns with novel material provided the Ab Ex artists with diverse abstract images never before seen.

Cryoart: An experiment in mark making

The FAWC workshop that I attended focused on making experimental marks on paper that went beyond traditional drawing media. Motherwell did some of his finest work in his studio at the Day's Lumberyard, which is now the site of the FAWC [18]. So it is not surprising that my thoughts when I attended this workshop would be imbued with his spirit; I sought to couple this with my knowledge of science to make new marks. Prior to my arrival, I came up with the idea of drawing on paper submerged in liquid nitrogen, nitrogen gas cooled to -196 degrees Celsius (-321 degrees F) such that it liquefies. Liquid nitrogen is used as a cryogen to achieve very low temperatures used in superconductivity or to cool electronics. Dermatologists use it to freeze off warts. In my lab it is used to rapidly freeze cells and thus suspend their metabolism for their long-term storage. I thought combining liquid nitrogen with charcoal or paint might generate novel marks on the paper and provide a new way to generate a work of art. To my knowledge this had not been done before and could take advantage of my scientific insight and artist's eye. The following is a description of the "experiments" performed to develop this approach and written as I would write up a set of scientific experiments in a lab notebook.

Rationale

In developing this idea of "Cryoart" I began to use my scientific background and knowledge that is less accessible (or at least less intuitive) to most artists. Two physical properties come to mind when using liquid nitrogen. It is a liquid and it is very cold. As such this is a liquid into which paint and powder can disperse, but this medium does not wet the paper to permit diffusion as water would. Also, the extreme cold changes the physical properties of both paint (such as acrylic in water) and the paper itself by rapid freezing followed by rapid warming back to room temperature. These changes might influence the interaction of paint with paper dynamically in unusual ways; the pattern of marks may leave a visual record of these interactions.

Aim: To investigate the feasibility of using liquid nitrogen with drawing and painting media to create interesting marks on paper.

Preliminary Data

I performed a few quick experiments in my office at Tufts University School of Medicine. I prepared a Dewar flask (a large thermos) filled with liquid nitrogen and had a few art media at hand: charcoal powder, charcoal stick, black magic marker, and color pencils. I wore latex gloves like those in the doctor's office to protect my hands from the extreme cold. Liquid nitrogen can remove warts in small amounts and shatter tissue in the amounts I was using.

I poured the liquid nitrogen on small (8" x 11") sheets of Fabriano paper in a metal box to contain the cryogen. The liquid nitrogen bubbled and churned quickly freezing the paper and surrounding air. This generated a wave of condensed water and carbon dioxide and looked like a dense fog, similar to the effect one see's dropping dry ice (a more familiar coolant at a mere -78 degrees Celsius) in water. There were crackling sounds from the extreme cold contracting the metal of the box. As I poured charcoal powder into the fog, this mixture spattered and churned

pushing around the charcoal. Once the paper had warmed and the fog cleared, the experiment appeared a success and had indeed made interesting patterns as predicted. However, these patterns were lost as I lifted the paper, because there was nothing that affixed the charcoal to the paper; there was only a faint halo of the interactions.

Next I started drawing on a second sheet that was bubbling with liquid nitrogen. I could feel the extreme cold through the gloves; the gloves immediately became crisp and rigid but still protected my drawing hand from direct contact with the cryogen. I used charcoal stick that was remarkably unaffected in the line made: the liquid did not wash away the line and freezing the paper and the charcoal did not affect its ability to make a mark. In contrast, the black marker froze on contact, and the ink could not disperse onto the paper. Also, color pencils left only a faint trace, perhaps due to the freezing of the slight humidity of the paper; it was akin to trying to write on ice. The pigment of color pencils contains wax and when ultra-chilled, the wax cannot "melt" by friction as one draws the point across the frozen and slippery surface of the super-cooled paper.

What did I learn from these preliminary experiments? Charcoal dust made an interesting pattern, but I needed to add glue and water to retain the pattern. The water might change the interaction, but I needed to use it. Second, the drawing I made with a charcoal stick looked similar to an ordinary drawing, but perhaps because I was drawing while the liquid nitrogen was bubbling and as I contemplated losing my hand, there seems to be an additional dynamic psychic energy to the lines. Third, using applied media by pen or color pencil wasn't effective. Perhaps applying color as water-diluted acrylic is the way to go. In future I would also use larger paper so that there would be areas with and without the cryogen. Finally, while liquid nitrogen itself is likely safe, it does create aerosols from the media used that when inhaled or exposed to eyes may be hazardous so proper protection is recommended.

Liquid nitrogen experiments at FAWC

I drove from my lab in Boston to Provincetown on a hot August day with a large Dewar flask containing 4 liters of liquid nitrogen; I hoped it wouldn't explode in my car. There was no explosion, but by the time I was ready to try Cryoart on the first day of the workshop, I only had 1 liter or so left. Despite the amazing insulation properties of the vacuum enclosed mirrored glass of the Dewar, most of the liquid nitrogen had evaporated. Before I began, I asked for permission from my classmates; I made it clear what liquid nitrogen was and the limited danger it might present ("No, It's not laughing gas").

Materials and Methods

I placed a sheet of 22" X 30" Arches watercolor paper in a large tray normally used for developing large photographs. I elected to use my best paper because it is tough and textured and might give interesting flow patterns compared to smooth paper. I prepared three media for these experiments. The first medium was charcoal powder mixed with Elmer's glue and water. This was a simple medium and ancient; charcoal residue from fire pits may have been humankind's first drawing tool (albeit without Elmer's glue). As charcoal powder does not dissolve but instead forms a slurry, I hoped that would give texture as well as interesting flow patterns and the

glue would fix these patterns onto the paper. Second, I used sumi ink hand-ground onto an ink stone. This is a very traditional Asian medium, and given my Asian-American roots, I like using it. Its suspended blackness would vary by dilution and flow would perhaps create interesting patterns of gray scale. Third, I used vermillion (bright orange red) acrylic paint in water. This would provide bright color and the plastic nature of the acrylic might respond differently to super-cooling. The color was chosen again based on my Asian roots. Vermillion ink is used in the chop stamps that traditional Chinese artists use for their signature on brush paintings.

The plan was to pour one medium and liquid nitrogen onto the paper and to let them collide permitting the action of super-cooling, flow and rapid rewarming to make magic (see videos). While the artist's hand influences the pattern by the dynamic action of how the medium is applied (*e.g.* diagonal *vs.* vertical, dripped *vs.* poured, fast *vs*. slow), there is a high degree of fortuitous accident to exploit.

The experiment itself is quite dramatic: the rise of fog and the bubbling and churning I had come to expect from the preliminary experiments. Also, the creaking from the tray was similar but louder perhaps due to the freezing and contraction of the plastic being more severe than the small stainless steel tray. I was perhaps fortunate that the large plastic tray did not shatter. What was entirely unanticipated were the effects due to the presence of liquid water. While I expected the churning and fog to increase (like putting dry ice in water), there were mini explosions of popping and crackling that sprayed interesting patterns that looked like fireworks on the paper. This was due to drops of water-based media freezing around liquid nitrogen that would explode when liquid rapidly evaporated to gaseous nitrogen, simultaneously shattering and propelling the frozen pigment shell in many directions.

Results

The three media gave different patterns outlined below.

1. Charcoal powder in water with Elmer's glue: http://vimeo.com/74964590
This mixture partitioned into a thick black paste and a thin particulate suspension and these two phases responded differently to the liquid nitrogen. The paste settled but created sharp spikes reflective of the exploding frozen pellets, while the suspension flowed with the liquid nitrogen forming ghostly veils. This was the most successful of the three experiments and produced great patterns and textures (Figure 1). The composition is dynamic and the diversity of marks extraordinary. In addition to long explosive streaks, there are areas of diffusive flow and dense layered blackness like coal deposits. I see mark combinations on this page that I can't think of how to achieve otherwise and I saw no need for further working of the paper.

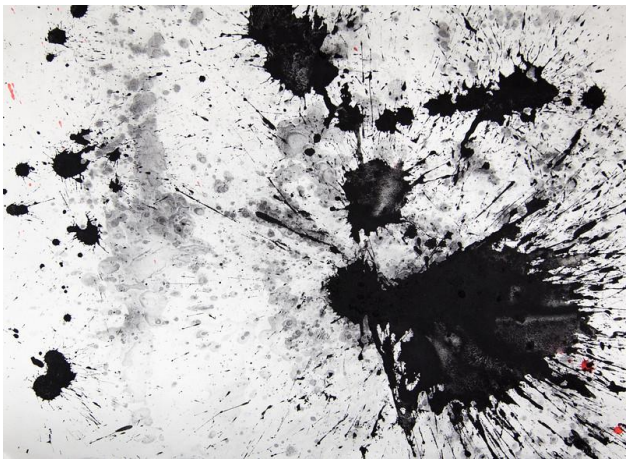


Figure 1

2. Hand ground Sumi ink: http://vimeo.com/74965168

As the liquid ink freezes it encases liquid nitrogen and when nitrogen evaporates, the frozen black beads exploded with lots of crackle and popping. However, I found the initial pattern generated to be less interesting than the charcoal powder work because it lacked the layered effects and perhaps one could achieve the same effects by splattering without liquid nitrogen. I then went back into the paper and added more liquid nitrogen and began a drawing of a clay figure; I used a charcoal stick. I went on to use this drawing as a template for a collage work applying chemicals representing elements as media such as copper wire, crushed chalk and cobalt blue paint (Figure 2).

Figure 2

3. Vermillion acrylic paint in water: http://vimeo.com/74963823

This provided a spectacular sound and light show and gave a remarkable explosion of orangey redness. The pattern shows a more elongated splatter than the other two perhaps due to the elastic properties of acrylic. I used this work for the background of a collage combining it with figure cutouts derived from my old calligraphy studies (Figure 3). The completed work illustrates my personal thoughts on the loss of culture and values in contemporary China as well as my own loss growing up and alienating myself from my cultural roots.

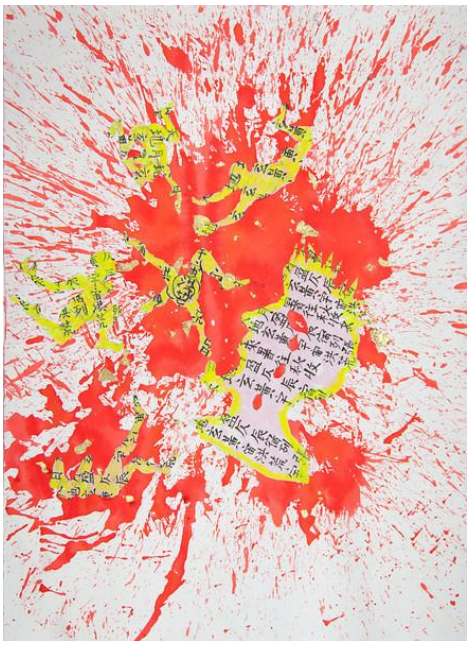


Figure 3

Conclusions

The conclusions of the experiment support the Aim. Liquid nitrogen does provide a novel way to make interesting marks and the use of it bears further investigation. I'm following this up by developing a series of similar drawings by combining liquid nitrogen with different chemicals beyond traditional pigment. I have begun as series using chemical elements as art media (see www.danjayart.com), for example silver chloride precipitating out as a silver rain through the cryogen leaving its trace on the paper below. These studies take advantage of my knowledge of chemical reactions, but the primary purpose remains to create an interesting work of art.

What to learn and where to go from here

This was a fun and exciting set of experiments to bring to FAWC where so much innovation and collaboration in the arts has occurred through the decades. Places like FAWC motivate the entire community to have the courage to strive for innovation. My experiments were welcomed, and feedback and suggestions from Stopforth and my fellow attendees was encouraging. While not intentional, in retrospect, it is clear that my experiments were influenced by Ab Ex art. The application of paint and ink evokes Frankenthaler's pouring technique with the added dynamism from the action of the liquid nitrogen. The drawing into liquid nitrogen has aspects of the automatic drawings of Matta and Ernst that influenced Motherwell, Tworkov and others.

The juxtaposition of my work with that of the Ab Ex artists in no way should suggest anything about the importance of the current work or novelty of combining art and science. Hans Hofmann was influenced by his study of science [19] and his paintings have a clear experimental design aspect. Instead, this study simply describes how a trained scientist inspired by these groundbreaking artists thinks about an art problem: making interesting art using new material. It

also illustrates how science informs art, generating a new way to apply pigment by taking advantage of extraordinary physical properties not accessible to prior generations of artists. While I do not expect liquid nitrogen to be added to the artist's toolbox, I believe it shows what science can bring to art. It is exemplary of the interdisciplinary spirit of the FAWC to see what happens when two fields interact. I would like to think that Bultman, Motherwell and Tworkov would have been pleased.

When I started this project, I thought of it as interdisciplinary; I thought I had applied techniques from one field and transferred it to another. However, upon reflection, I realize making art with liquid nitrogen is really transdisciplinary (first coined by Piaget [20]), stressing the unity of knowledge and inquiry and transcending disciplines. These drawings necessitated a scientific knowledge of how art media would interact with paper in a super cooled and liquid environment, but they also required an artistic eye to manipulate the media to generate interesting marks. Many great minds have transcended disciplines (the medical missionary and theologian Albert Schweitzer [21] was an exceptionally talented organist and physicist Richard Feynman became skilled at figure drawing [22]). Indeed, for Schweitzer and Feynman, their transcendence was bidirectional. Schweitzer's deep spirituality informed his interpretation and championing of Bach's organ music while his organ recitals provided funding for his missionary work [21]. Feynman's figure drawings show a linear clarity [22] while one of his contributions to physics was to introduce the Feynman diagrams, simple linear drawings that illustrate interaction events in quantum electrodynamics and other complex physical phenomena [23].

The studies presented in this current article indicate that even the less illustrious can contribute beyond our own fields. While this article is focused on how my science informs my art, it has made me think about how my art informs my science. Prior to this project, I would have dismissed the idea. However, now I speculate that despite my efforts to segregate them, there are clear themes and approaches in which how I do visual art has affected my research. My science is very visual and addresses the complexity of protein interactions in cells. When I think about my research, I imagine myself sitting on a protein watching the countless dynamic interactions around me and trying to define order amid the chaos. This is actually how I do art as well; whether I am sketching the complicated actions of a market scene or making the complex marks shown here in the liquid nitrogen drawings, I am trying to create order from complexity.

When historians of science or art write about their respective fields, they tend to emphasize the unique aspects and differences between artists and scientists. The Cryoart developed for the FAWC workshop uses both science and art and shows that for the processes of creating, they are perhaps more similar than different. In my discussions with artists and scientists, I have always found more similarity than difference in their creative processes. Both disciplines require problem solving and experimentation, judgment and editing. For example Henry Geldzahler, who curated the 1969 Metropolitan Museum of Art exhibition *New York Painting and Sculpture: 1940-1970*, likened the Ab Ex period to "a group research project the way pure mathematics might be so that advances that are made in the field are advances that become available to everybody who's working in it." [24]. While the FAWC is a special place conducive to interdisciplinary work, most universities have artists and scientists who could benefit from collaboration. For example, Cooper Union in New York, with its specific strengths in art and engineering, would be an ideal incubator. I hope that this study inspires other artists and

scientists to talk and perhaps work together. Such dialog and collaboration could generate new ideas beyond what a single person can. I look forward to the interesting work that would follow.

References

1. Jay D.G. Selective destruction of protein function by chromophore-assisted laser inactivation. Proc Natl Acad Sci U S A. 85(15):5454-8, 1988.

2. Li W., Stuurman N., Ou, G. Chromophore-assisted laser inactivation in neural development. Neuroscience Bulletin. 28 (4): 333-341, 2012.

3. Ahrens N. PROVINCETOWN: THE ART COLONY A Brief History and Guide. Provincetown Art Association and Museum, 2000.

4. *ibid.*

5. Sandler I. The Triumph of American Painting. Praeger Publishers, New York, 1970.

6. New York Provincetown a 50s Connection. Provincetown Art Association and Museum, Provincetown MA, 1994.

7. *ibid.*

8. *ibid.*

9. Sandler I. The Triumph of American Painting. Praeger Publishers, New York, 1970.

10. *ibid* pp 211-215.

11. Vevers T, 1994 cited in Carmean EA Coming to Light: Avery, Gottlieb, Rothko: Provincetown Summers 1957-1961. Knoedler. New York. 2002, p 17.

12. Motherwell R. A Collage for Nathan Halper in Nine Parts. (1983) cited in The Collected Writings of Robert Motherwell S. Terenzio ed. Oxford University Press, 1992, p 266.

13. Motherwell R. Reflections on Painting Now (1949) cited in Terenzio, 1992 p 65.

14. Judson H.F. The Eighth Day of Creation. Simon and Schuster, New York, 1979, p 188.

15. *ibid* p 44.

16. Motherwell R., Provincetown and Days Lumber: A Memoir (1978) cited in Terenzio 1992, p 223.

17. de Antonio E , Tuchman M, Albers J Painters Painting: A candid history of modern art. Abbeville Press, New York, 1984, p 77.

18. Motherwell R., Provincetown and Days Lumber: A Memoir (1978) cited in Terenzio 1992, p 223.

19. Seitz W.C. Abstract Expressionist painting in America. Harvard University Press, Cambridge MA, 1983, p 4.

20. Nicolescu B., Transdisclipinarity: Theory and Practice. Hampton Press, New York, 2008.

21. Schweitzer A., Out of My Life and Thought: An Autobiography H. Holt, New York, 1990.

22. Feynman M., The Art of Richard P. Feynman. Routledge Press, London, 1995.

23. Mattuck R. D. A guide to Feynman Diagrams in the Many-Body Problem 2nd Ed, Dover Publications, New York, 1992.

24. de Antonio, p 79.

REVIEWS

Bammer, Gabriele. *Disciplining Interdisciplinarity: Integration and Implementation Sciences for Researching Complex Real-World Problems*. Canberra: Australian National University E Press, 2013. http://epress.anu.edu.au/titles/disciplining-interdisciplinarity. xxiv + 472 pp. E-Book ISBN: 9781922144287.

Gabriele Bammer has recently offered a book length account describing the process of creating a discipline of interdisciplinarity – titled, aptly enough, *Disciplining Interdisciplinarity* (ANU Press, 2103). Her goal is laudable. She asks: "How can academic research enhance its contributions to addressing widespread poverty, global climate change, organized crime, escalating healthcare costs or the myriad other major problems facing human societies?" Her answer: through the development of a method for combining disciplines for problem solving:

> there is no substantial, well-established, internationally accepted methodology. There are no standard procedures for deciding, for example, which disciplines to include, what each discipline will contribute or how the different findings will be melded together (Bammer, 2013).

Bammer suggests that the field of Integration and Implementation Sciences (I2S) could function as a discipline on the model of statistics.

In an advance over others, Bammer recognizes that this project calls for both theoretical and institutional elements. Theoretically, I2S consists of an intellectual architecture of three 'domains' combined with a five question framework. The three domains consist of

- Synthesizing disciplinary and stakeholder knowledge,
- Understanding and managing diverse unknowns, and
- Providing integrated research support for policy and practice change.

These domains are then framed by five questions:

1. What is the integrative applied research aiming to achieve and who is intended to benefit?
2. What is the integrative applied research dealing with—that is, which knowledge is synthesized, unknowns considered and aspects of policy and practice targeted?
3. How is the integrative applied research undertaken (the knowledge synthesized, diverse unknowns understood and managed, and integrated research support provided), by whom and when?
4. What circumstances might influence the integrative applied research?
5. What is the result of the integrative applied research?

Like William Newell, Allen Repko, and others, Bammer pursues the goal of identifying a uniform set of questions applicable to every interdisciplinary situation. But she matches her

theoretical account with a call for a worldwide, Manhattan Project or Human Genome Project-level effort to collect and collate information on thousands of interdisciplinary research projects, looking for "concepts, methods and case examples."

One would expect positive results from such an endeavor – if Bammer and colleagues can get it off the ground. But the source of its value is unlikely to reside where she thinks. Rather than in the development of an interdisciplinary methodology, its value will more likely come from the sharing of a wealth of particular insights and rules of thumb that have developed in a piecemeal manner.

There is another, non-methodological way to approach interdisciplinarity. Martin Heidegger shows us the way here. Heidegger goes largely unappreciated as a thinker of interdisciplinarity, even though much of his *œuvre* in effect functions as a critique of disciplinarity. On Heidegger's account, a methodology is the last thing you want in the search for truth – a point that analytic philosophers of science have come around to, having mostly given up on identifying a scientific method.

Heidegger sees the application of a methodology is a kind of theoretical brutality where we disregard the individuality of an event. The imposition of a method forces a given situation to live up to a pre-established standard rather than allowing the situation to suggest its own standard for evaluation. Methodism thus fundamentally misunderstands the nature of thinking, which is at root a kind of questioning. "Words are not terms, and thus are not like buckets and kegs from which we scoop a content that is not there. Words are wellsprings that must be found and dug up again and again, that easily cave in, but that at times also well up when least expected."

Perhaps, in a given situation, the political stakes are particularly high. Perhaps a great deal is at stake in terms of cost or environmental protection. Perhaps a cultural legacy is at risk, or the matter is particularly religiously fraught. Lists like Bammer's or Newell's – for Newell, 'defining the problem', and 'determining which disciplines have relevant information' – are not pointless; addressing a problem will require moments of introspection on topics such as those he lists. But someone who seeks to promote an interdisciplinary perspective on a problem needs to be able to do more than list propositions. The project of creating a discipline of interdisciplinarity, with its accompanying dependence on a rigorous methodology, brings too much theoretical firepower to our problems. Interdisciplinary success is more a matter of practicing a set of virtues -- openness to new perspectives, a willingness to admit the inadequacies of one's own point of view, to be wrong and to play the fool, and generosity in interpreting the position and motives of others.

Robert Frodeman
University of North Texas

Robert Frodeman, ed. Julie Thompson Klein and Carl Mitcham, associate eds. J. Britt Holbrook, managing ed. *The Oxford Handbook of Interdisciplinarity*. New York: Oxford UP, 2010. xxxix + 580 pp. Paperback ISBN: 978-0-19-964396-7.

Few people will want to read *The Oxford Handbook of Interdisciplinarity* from cover to cover, as I have, but anyone interested in learning more about interdisciplinary studies should definitely consult the book. It offers a wealth of essays (37 total, plus 14 "boxes" with related material) that define key terms and explore current issues in interdisciplinary, cross-disciplinary and transdisciplinary studies as they relate to general education, humanities, social sciences, natural sciences, engineering, cognitive science, religious studies, environmental science, media studies and other traditional and emerging disciplines and initiatives. In addition, Robert Frodeman presents what amounts to a manifesto for interdisciplinarity in the Introduction, stating that "to one degree or another, the contributors to this volume share the intuition that the solution to our social, political, intellectual, and economic problems does not simply lie in the accumulation of more and more knowledge. What is needed today is a better understanding of the relations between fields of knowledge, a better grasp of the ways knowledge produced in the academy moves into society, and a better sense of the dangers as well as the opportunities of continued knowledge production" (xxx). *The Oxford Handbook of Interdisciplinarity* significantly contributes to the kinds of knowledge and understanding Frodeman advocates.

The editors have organized the book into 5 sections: "Part I: The Terrain of Knowledge," "Part 2: Interdisciplinarity in the Disciplines," "Part 3: Knowledge Interdisciplined," "Part 4: Institutionalizing Interdisciplinarity," and "Part 5: Knowledge Transdisciplined." Most of the essays are useful, clear, and focused, although there are occasional frustrating lapses into jargon, as in Wolfgang Krohn's "Interdisciplinary cases and disciplinary knowledge" (Part I), which uses the terms "'idiographic component'" and "'nomothetic component'" to describe the specific vs. the general features of a problem or case. He borrows the terms from the neo-Kantian philosopher Wilhelm Windelband; while I admire Kant, I seldom turn to him for clarity, so I found the terms more distracting than helpful.

Since it is impossible to evaluate all 37 of the handbook's essays in the confines of this brief review, I will instead focus on particularly noteworthy selections from Parts 1, 3, 4 and 5. "Part I: The Terrain of Knowledge" establishes an overview of interdisciplinarity, with essays on the history of knowledge formation, different kinds of interdisciplinary studies, philosophies of interdisciplinarity, and "deviant" interdisciplinarity. One of the most useful essays in this section is Julie Thompson Klein's "A taxonomy of interdisciplinarity," which clarifies the distinctions between multidisciplinary, interdisciplinary, and transdisciplinary. According to Klein, multidisciplinary studies juxtapose but don't necessarily integrate different disciplines, while interdisciplinary approaches integrate, link, and blend disciplines. Transdisciplinarity refers to "a common system of axioms that transcends the narrow scope of disciplinary worldviews through an overarching synthesis" (24), and it often involves bringing multiple disciplines together to solve particular problems, with the idea that real world problems should "frame research questions and practices, not the disciplines" (as can be seen in the sustainability discussions in Part 5).

Several essays, such as Cathy Davidson's "Humanities and technology in the information age" (in Part 3), and Beth A. Casey's "Administering interdisciplinary programs" and Stephanie Pfirman and Paula J.S. Martin's "Facilitating interdisciplinary scholars" (both in Part 4), point out the difficulties in establishing and maintaining interdisciplinary programs in academia. Creating an interdisciplinary minor at Duke, Davidson reports, "prompted the rethinking of various forms of support, curricular matters concerning cross-listed courses (and which department would get the credit for which enrollments), faculty rewards . . . distribution requirements for students," etc. "The accounting of student hours and faculty full-time equivalences (FTEs) proved almost impossibly difficult," she adds (216). As Casey notes, "[a]dministering interdisciplinary programs, centers, institutes, or schools is a challenge requiring entrepreneurial leadership, knowledge of the best processes of interdisciplinary scholarship, curricular design, pedagogy, and assessment, as well as the ability to network for collaboration both within and without the university or college" (346). In short, it is not hard to see why establishing robust interdisciplinary programs can take more time, effort and patience than most interested parties might care to invest. But as William H. Newell, founding president of the Association for Integrative Studies, asserts in his essay on undergraduate general education (in Part 4), "interdisciplinarity can be understood as an attempt to right the balance of Western Thought," which has become increasingly and detrimentally focused on highly specialized areas of study. As such, interdisciplinary studies are far more than a just a fad, and they merit the undeniable time and effort required to create and maintain them as academic programs.

When I began reading *The Oxford Handbook of Interdisciplinarity*, I expected to find good definitions of interdisciplinary terminology, accounts of the history of the field and descriptions of effective interdisciplinary research practices and academic programs. And indeed the volume delivers on all of the above. What I hadn't expected but found anyway was a diverse and extended argument for interdisciplinary approaches, not just in academia, but in global efforts dealing with hunger, poverty, disease, environmental crises and many other areas of pressing current interest. The *Handbook* makes a valuable contribution to many fields and will be an essential reference tool for anyone in an interdisciplinary program or research area for years to come.

Natalie McKnight
Boston University

Lyall, Catherine, Ann Bruce, Joyce Tait, and Laura Meagher. *Interdisciplinary Research Journeys: Practical Strategies for Capturing Creativity*. London: Bloomsbury, 2011. 240 pp. Hardback ISBN 978-1-84966-013-6.

During most of my teaching career I never concerned myself with what students in my undergraduate interdisciplinary courses would face if they became inspired to go on to become interdisciplinary researchers, especially on interdisciplinary teams. I was engaged in liberal education that familiarized them with interdisciplinary process, instilled interdisciplinary habits of mind, and inculcated the skills, sensitivities, and sensibilities required to address the myriad complex problems they would face in their jobs, communities, and personal lives. *Interdisciplinary Research Journeys* lays out the challenges confronting students such as my own, in graduate school and each subsequent phase of their career, who are drawn to interdisciplinary studies. Even more prominent in the book, however, are bullet-point, nuts-and-bolts recommendations at each step in the "research journey" for how to overcome those challenges. These take the form of case studies, key advice, comparative lists (e.g., benefits and risks), and questions to ponder. I encourage teachers, staff, and administrators involved in interdisciplinary undergraduate courses and programs to read this book with an eye to how well their students are being prepared for interdisciplinary careers.

For those of us interested in interdisciplinary studies itself, Catherine Lyall and her colleagues have provided a remarkable range of perspectives on interdisciplinary research. They look at it from the perspectives not only of individual researchers, but also of dissertation supervisors, department chairs, directors of research centers, university administrators, and funding agencies. Moreover, because the authors' extensive experience with promoting and evaluating interdisciplinary research has been primarily in the UK, especially Scotland, (supplemented with spotty references to interdisciplinary research in the US and transdisciplinary research in the continental EU) American readers get a rare cross-cultural view of interdisciplinary studies. The array of institutional and cultural perspectives constitutes a tacit invitation to integrate their insights into a more comprehensive and robust understanding of interdisciplinarity.

Unlike so much of the writing on interdisciplinary studies in the US, especially scholarship spawned by the Association for Interdisciplinary Studies, this book is not concerned with the intellectual and cognitive challenges of interdisciplinary teaching and research, but rather with those challenges posed by institutional structures, policies, procedures and culture. In contrast to the focus of AIS on developing a profession of dedicated interdisciplinarians, the authors view interdisciplinarians the way we used to view Olympic athletes—as talented and hardworking amateurs who still hold a day job (here, a discipline). Hence, they view interdisciplinarity as something to be learned largely through experience rather than through professional training in interdisciplinary process and best practices. To be fair, the authors have pioneered the use of Master Classes that explicitly train graduate students in interdisciplinary research, but those classes seem more focused on institutional than intellectual challenges.

Consequently, when they diagram the overall system of interdisciplinary research in Figure 2.1 (p. 21), they depict it as situated within individual universities rather than operating at a more macro level. Missing are the professional associations, journals, and graduate programs that

provide training in interdisciplinarity and contribute to the development of its intellectual foundations. Later in the book Lyall and her colleagues devote an entire chapter to the importance of establishing academic standards for evaluating interdisciplinary research, but they settle for relying on the judgment of individual experienced interdisciplinary researchers rather than on the codified collective judgment of an interdisciplinary studies profession.

It is clear, though, that the authors are avid enthusiasts of interdisciplinary research, and they seem to have independently arrived at a remarkably similar conception of interdisciplinarity to that promoted by AIS in particular (complete with a focus on process, especially integration, that can be divided into stages or steps carried out by either teams or individuals). They also insist on the complementarity of the disciplines and interdisciplinary studies. But they sometimes appear to think of interdisciplines, rather than a more comprehensive understanding of a particular complex problem, as the primary fruit of interdisciplinary labors. And some of their ideas and wording may be off-putting, e.g., their assertions that some problems are inherently interdisciplinary whereas we would say they are complex and it is the study of them that's interdisciplinary, and their repeated references to the integration of disciplines rather than their insights. Still, it is clear to me that interdisciplinarians in the US and UK have much in common yet much to learn from each other.

Interdisciplinary Research Journeys is an excellent place to start.

William H. Newell
Executive Director, Association for Interdisciplinary Studies (formerly the Association for Integrative Studies)

ANNOUNCEMENTS

THATCAMP NEW ENGLAND: HUMANITIES, TECHNOLOGY AND PEDAGOGY CONFERENCE

An Interdisciplinary Conference
to be held
May 30 & 31, 2014
Boston University
College of General Studies
871 Commonwealth Avenue
Boston, MA

"THATCamp stands for 'The Humanities and Technology Camp'. It is an unconference: an open, inexpensive meeting where humanists and technologists of all skill levels learn and build together in sessions proposed on the spot. An unconference is to a conference what a seminar is to a lecture, what a party at your house is to a church wedding, what a pick-up game of Ultimate Frisbee is to an NBA game, what a jam band is to a symphony orchestra: it's more informal and more participatory" (http://thatcamp.org).

The Center for Interdisciplinary Teaching and Learning will have additional information soon, but for now, save the date, so you can join us to discuss technology, the Humanities and teaching.

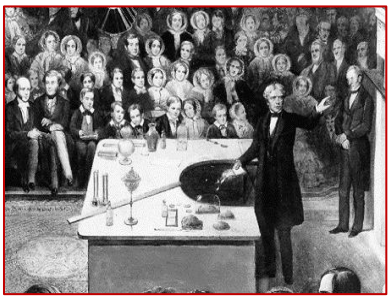
If you have any questions, please contact Joshua Pederson at pederson@bu.edu.

Click here to register for "THATCAMP New England: Humanities, Technology and Pedagogy."

SUMMER INSTITUTE

"VICTORIAN BOSTON"

July 11 & 12, 2014



Visit Boston urban open space. Watch a live "magic lantern" show. Examine how Victorian reformers changed our world.

The Center for Interdisciplinary Teaching & Learning (CITL) institutes are designed for alumni, parents and members of the general public who enjoy exploring a subject of common interest from a variety of disciplinary perspectives. These institutes draw on the expertise of professors at BU's College of General Studies. Victorian Boston presenters include the following: Millard Baublitz, Associate Professor in the Division of Natural Sciences and Mathematics, will present "Victorian Era Demonstrations in Electricity and Magnetism: Real-time Recreations of Experiments by Victorian Scottish and English Scientists"; Cheryl Boots, Senior Lecturer in the Division of Humanities and author of Singing for Equality: Hymns in the American Indian Rights and Antislavery Movements, 1640-1855, will present on "British Hymns and American Abolitionists, the Mid-century Sounds of Social Protest in Boston"; Sam Hammer, an Associate Professor in the Division of Natural Sciences and Mathematics and a botanist with a strong interest in the connections between the arts, aesthetics, and science, will lead a field trip to Mount Auburn Cemetery and discuss how 19th century Boston created urban open spaces; and Kathleen Martin, Senior Lecturer in the Division of Social Sciences and author of Hard and Unreal Advice: Mothers, Social Science, and the Victorian Poverty Experts, will present "A Science of Society: Victorian Reformers and the Quest for Scientific Validity." Victorian Boston will also include a live performance by the American Magic-Lantern Theater, the only U.S. professional traveling company of its kind. The theater re-creates Victorian 'Magic-Lantern Shows', the popular 1890s combination of projected image, live drama, and music. The American Magic-Lantern Theater uses antique equipment, and the content, music, and dramatic style of the 1890s. (http://www.magiclanternshows.com/introducing.htm)

Victorian Boston will explore how 19th century reformers challenged conventional wisdom about their world and the people who inhabited it. **In Boston** political, environmental and scientific landscapes changed radically. Open spaces, increasingly rare in the growing urban environment, were designed to preserve nature and enhance public welfare (images 1 & 2). At the same time, abolitionists were signing about equality (image 3). How did these environmental and social changes forever alter Boston?

Image 1 Sam Hammer

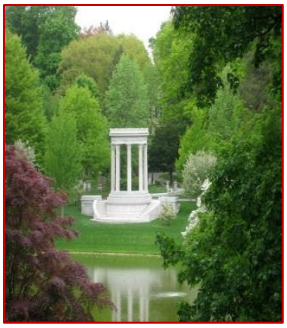


Image 2 Sam Hammer

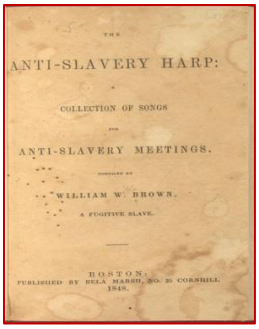


Image 3 Library of Congress

In London the post-industrial population boom, immigration and other factors increased the number of people living in poverty (image 4). Social scientists were determined to use scientific methods to study and ameliorate poverty, but did their quest for "objective" knowledge make the problem worse (image 5)? British scientists were making great strides, especially in the area of physics. How would this alter our understanding of the world (image 6)?

Image 4 Google Image

Image 5 Google Image

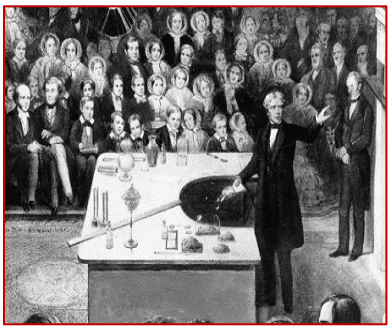


Image 6 Wikipedia

In Boston and London magic lantern shows were becoming increasingly popular. What can we learn about the 19th century and beyond from these lively shows full of music, drama, image and humor (images 7 & 8)?

Image 7 Public Domain

Image 8 Brooklyn Museum

****

With regard to lodging for the "BU Victorian Boston Institute," you can stay in a dorm room in the Student Village OR you can stay in one of the two hotels below. Blocks of rooms have been reserved until **June 11, 2014**.

Boston University Dorm Room has single rooms available in suites of four that share two baths and a common area for $79.00 per person per night. ***We will make those reservations for you***.

Hotel Commonwealth has rooms available for $259.00 per night not including taxes. ***You are responsible for making your own reservation.*** The phone number to make your reservation is 866-784-4000 or 617-532-5019. In order to get the above rate, you will need to mention "BU College of General Studies."

Hotel Buckminster has Deluxe Queen rooms available for $176.00 per night not including taxes and Standard Double Twin rooms available for $186.00 per night not including taxes. ***You are responsible for making your own reservation.*** The phone number to make your reservation is 800-727-2825. In order to get the above rate, you will need to mention the "BU College of General Studies."

Experience Victorian Boston in all its interdisciplinary wonder! Join us for a memorable weekend of fun, friends and exploration of America's Victorian background. Please see the full schedule below. If you have any questions, please contact **msullvan@bu.edu** or **akcook@bu.edu**.

Click here to register for "Victorian Boston: An Interdisciplinary Institute."

IMPACT BEST ESSAY COMPETITION

We did not have a winner for the 2013 *IMPACT* Essay contest.

The winning essay from 2012 is "Community Gardening Activities in the Higher Education: Planting Seeds of Inspiration" by August John Hoffman from Metropolitan State University.

The Editors of *IMPACT: The Journal of the Center for Interdisciplinary Teaching & Learning* invite submissions of scholarly and creative non-fiction essays between 500 and 5,000 words on any aspect of interdisciplinary teaching or research. Essays should be readable to a general, educated audience, and they should follow the documentation style most prevalent in the author's disciplinary field. Essays should be submitted by **the first Monday in December** to http://CITL.submittable.com/submit. CITL reserves the right not to publish a winner if there are no winning essays.

The author of the winning essay will receive a $250 award and publication in IMPACT.

BIOS

Brian Culver is a Master Teacher in the Global Liberal Studies Program at New York University, in which he teaches a three-course sequence called "Cultural Foundations": a cross-cultural (both Western and Non-Western) historical survey (from antiquity to the present) of literature, the visual arts, and music. Although his doctorate is in English literature and he has written on the poetry of John Donne and John Milton, most of his current work is on global music and television.

Robert Frodeman is Professor of Philosophy and founding Director of the Center for the Study of Interdisciplinarity at UNT (www.csid.unt.edu). His work ranges across environmental philosophy, the philosophy of science and technology policy, and the philosophy of interdisciplinarity. Frodeman's *Sustainable Knowledge: A Theory of Interdisciplinarity* (Palgrave MacMillan) will be published in 2013.

Dan Jay received his Ph.D. in Biochemistry and Molecular Biology from Harvard University. He continued his career there as a junior fellow in the Harvard Society of Fellows and as a faculty member becoming the John L. Loeb Associate Professor of the Natural Sciences. He is currently Professor of Developmental Molecular and Chemical Biology at Tufts University School of Medicine. He has studied art with William Reimann and Paul Stopforth and has had solo exhibitions at Harvard University, the Gallery of Nature and Temptation, the Boston Public Library and most recently the Massachusetts State House.

Natalie McKnight is Dean *ad interim* and Professor of Humanities at the College of General Studies, Boston University. She has published three books on Victorian fiction: *Idiots, Madmen and Other Prisoners in Dickens* (St. Martin's, 1993), *Suffering Mothers in Mid-Victorian Novels* (St. Martin's/Palgrave, 1997), and *Fathers in Victorian Fiction* (Cambridge Scholars Press, 2011). She has also co-authored and co-edited a two-volume anthology of art and literature, *Culture in Context: An Introduction to Literature* (Cognella, 2013, with Adam Sweeting). McKnight co-edits *Dickens Studies Annual* and is the Archivist for *The Dickens Quarterly.*

Bill Newell is long-time executive director of the Association for Interdisciplinary Studies, author of several books and forty articles and chapters on interdisciplinary higher education, and frequent consultant/external evaluator on interdisciplinary undergraduate courses and programs. Now an emeritus professor of interdisciplinary studies at Miami University, he taught interdisciplinary courses, largely in the social sciences, since 1969 at Temple University, the Paracollege at St. Olaf College, and then for over 35 years in the Western College Program at Miami University.

Kate Reavey has taught interdisciplinary courses for almost twenty years and has been a member of the Faculty Learning Communities with the Curriculum for the Bioregions Initiative (led by Jean MacGregor at the Washington Center for the Improvement of Undergraduate Education). She earned an M.A. in Poetry from U.C. Davis and has just completed her comprehensive exams in the doctoral program at Union Institute and University toward a PhD in Humanities and Culture with a focus on social justice. Her books of poetry include two limited

edition letter-pressed chapbooks and one longer collection. She is the editor for Enduring Legacies: the Native Cases Initiative and was recently awarded an NEH Bridging Cultures grant to create a course on treaty rights and democracy in the United States. In 2010, Reavey taught literature and creative writing in Florence, Italy as the WCCCSA exchange professor.