Integrative Thinking: Foreign Languages, Environmental Humanities, and STEM

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How can we bridge the so-called two-cultures divide through environmental-humanities initiatives or collaborations with the sciences and sustainability studies? Between the initial call for papers on the topic in advance of the 2019 MLA convention and the publication of versions of those papers in this issue of the *ADFL Bulletin*,[1] much has happened that confirms the sense of urgency that motivated the panel's intention to examine the changing landscape of language education in terms of its potential for creating STEM connections. On many campuses, funding opportunities and enrollment trends now encourage language programs to collaborate with the sciences, be it through grand-challenges courses, sustainability studies, or initiatives in the environmental humanities. Those curricular possibilities signal both the potential for a new relation to content in language programs and a fundamental rethinking of educational priorities. While humanities scholars embrace interdisciplinarity with enthusiasm, here we might pause to contemplate the precarity of our disciplines and to ask what such rapid change means for higher education.

Reassuringly, a 2018 report issued by National Academies of Sciences, Engineering, and Medicine, *The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree*, concludes that the evolving landscape of higher education signals the growth of collaborations that appreciate the distinct forms of knowledge production embodied in the humanities, arts, and STEM fields as complementary. Integrative approaches, as this path is called, have much to offer in terms of the learning experiences they provide to students, regardless of whether they are framed as multidisciplinary, interdisciplinary, or transdisciplinary projects. In advocating a capacious framework for such work, the report emphasizes that "there is no single goal of an integrative approach, but rather many different goals" (57).

Conceived as mutually beneficial to the humanities, arts, and sciences, the integrative perspective offers the possibility of renewal for language programs in particular. The paradigm shift associated with it creates an opportunity to restructure compartmentalized parts of our curriculum. By embracing this change, we have an opportunity to reimagine curricular structures that have over time become an obstacle to preparing students to thrive in a globalized world where environmental matters have existential significance.

As scholars of languages, literatures, and cultures, we value the kind of intellectual curiosity that explores the complexities of our world from the perspective of the humanities, though that means venturing into unfamiliar territory. Certainly, the conditions of higher education in the twenty-first century require us to think far beyond the "two cultures" invoked by C. P. Snow in 1959 to explain the artificial

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divide between the humanities and the sciences. That binary provided a starting point for the MLA conference panel's discussion. However, current conditions argue for a more complex investigation of what it means to bring the soft-skills perspectives of the humanities into conversation with STEM competencies.

The essays in this section offer a range of options for how departments and programs might proceed. While they focus on fruitful convergences between foreign languages and STEM fields, broadly defined, these accounts can also be seen as templates for other types of curricular reform. Taken as a whole, this rich sampling of initiatives foregrounds the value of comprehensive planning, content-driven curricular reform, and encouraging signs of institutional support for such work.

In "Thinking across Cultures: A Conceptual Lexicon for Foreign Languages and the Environment," Kate Paesani and Elena M. Past explore parallels between the disciplinary and theoretical perspectives of applied linguistics and pedagogy and those of literary and film studies in the environmental humanities. Informed by the authors' respective theoretical groundings in second language acquisition and material ecocriticism, the essay revisits the challenges of bridging the two-tiered division, which persist within many language departments. The essay's discussion of content courses anticipates the conceptual divides that arise when collaborations develop between language fields and other disciplines. Paesani and Past's discussion of multiliteracies frameworks, then, focuses on three concepts fundamental to research and teaching in many fields: situatedness, resources, and agency. The way forward they propose relies on the type of intellectual synergy that develops when common objectives can be identified. Accordingly, they advocate the pursuit of pedagogies derived from those principles as having the potential to support hopeful action in response to environmental challenges.

In their account of progressive curricular evolution, "Developing Sustainability Literacy: The Environment as a Catalyst for Change in Third-Semester Spanish," Gwendolyn Barnes-Karol and Maggie A. Broner consider the turn to postcommunicative approaches in connection with their pursuit of intellectually robust content related to understanding sustainability. Recognizing that twenty-first-century students are motivated by many interests, the authors advocate the value of learning through language rather than simply about it. They highlight aspects of the new curriculum they have designed that will be key for programs elsewhere seeking to undertake similar initiatives. These include attention to subtle differences in skills sets and learning outcomes that arise in content-driven learning—in particular, the greater emphasis on vocabulary acquisition, storytelling, and learner agency. The conclusions they reach, furthermore, point to the role that institutional context plays in helping establish connections between the efforts of language programs and other areas of academic study.

Calling upon the humanities to reclaim their full transformative social potential, Anna Stenport, Jenny Strakovsky, and Ryan Gemilere point to current STEM and business-education interest in liberal arts expertise as a positive trend in their essay, "Radical Interdisciplinarity: Science, Technology, and the New Humanities of the Twenty-First Century." Based on their experience in building the Language for Business and Technology program at Georgia Institute of Technology, they advocate

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forward-looking practices of "becoming by doing" as an alternative to the hesitant skepticism that surfaces periodically in the humanities. What is needed, the authors forcefully argue, is more robust articulation of humanities expertise. In the light of the current emphasis placed on global citizenship as a desired learning outcome, they propose that innovative integrated models of collaboration that create partnerships for the humanities with STEM and business have the potential to strengthen the position of languages in higher education.

While these three essays describe campus-specific efforts, they are situated accounts that in effect map a curated sampling of project types that may be taken as a starting point for innovation elsewhere. For language departments and programs seeking further examples, it is helpful to know that other resources to support these efforts are newly available or currently under development. The essay collection *Foreign Language Teaching and the Environment: Theory, Curricula, Institutional Structures* (2019), in the Modern Language Association series Teaching Languages, Literatures, and Cultures, spans the most commonly taught and many less commonly taught languages as well as various types of institutions (Melin).[2] The Association for the Study of Literature and Environment (*ASLE*; www.asle.org), which has worldwide affiliates, offers an expanding database of course materials that includes resources for language areas (e.g., syllabi, assignments, sample projects, experiential activities). In addition, the National Academies of Sciences, Engineering, and Medicine report provides a granular perspective on innovative initiatives with its "gallery" of exemplary projects, many of which include public-outreach components (233–58).[3]

A decade ago, James J. Farrell observed that "college is a place where students [can] think twice about American culture and ecosystems" (xii). Today we navigate an ever-wider global ecosystem that calls for an understanding of the complex dimensions of societies that will more fully recognize the profound interdependence of human cultures and nature. The rationale for exploring ways for language programs to engage in cross-disciplinary and interdisciplinary collaborations has never been stronger or more urgent, given the range of fresh challenges in areas where language expertise pertains—from climate change and resource sharing to social-justice issues and global migration.

LEED-certified buildings, renewable-energy systems, and recycling sort systems dot the campuses of colleges and universities and serve as constant reminders of the extent to which the sciences have become a daily part of our lives. Yet both we and our increasingly diverse groups of students, many of whom aspire to become STEM majors, crave the aesthetic pleasure afforded by the study of languages, literatures, and cultures—the unique ways of knowing that the humanities offer. Bringing language programs into conversation with the sciences can or should reposition the humanities to have a transformative impact on the educational process as a whole, liberating us from the constraints of a curriculum improvised to meet course-requirement checklists.

Already our teaching and research take place against the backdrop of update reports from the Intergovernmental Panel on Climate Change that have led the United Nations to conclude that "Climate Change is the defining issue of our time

and we are at a defining moment" ("Climate Change"). To take a pragmatic view, our institutions grapple with environmental and technological realities that are steadily reshaping our work. Short-term disruptions like the class cancellations that have resulted in the past two years from Hurricane Florence in the Carolinas, the Camp Fire in California, and the polar vortex in the upper Midwest foreground the precarity of the things we take for granted in contemporary life, and they remind us vividly that the pursuit of knowledge is bound up with tangible work to create habitable futures. Such realities are the new normal that current undergraduates will negotiate their entire lives.

Responding to that new reality and profound changes in higher education, the projects described here seek to integrate language education with STEM in mutually beneficial ways that can have far-reaching ripple effects. Ironically, the greatest challenge of work toward such curricular transformation is perhaps simply taking the first step, because it requires bold faith in the potential benefits of change. To put it another way, we face difficult choices that follow from an inconvenient question that could be transformative. Ten years from now, what will our students remember about the time they spent in our classes? If the answer turns out to be that we inspired them to create a cascade of hopeful action—if, indeed, we witness them growing to become intellectually curious, truly global citizens who surpass us in their ability to integrate humanities and STEM perspectives—we will have done much more than bridge the two-cultures divide.

Notes

1. The three essays presented in this section grew out of presentations in session 476 of the MLA Annual Convention, "Foreign Languages in the STEM Age," on 5 January 2019. In addition to the three contributions included here, the panel also included a presentation by Niko Tracksdorf (University of Rhode Island), "STEM Topics in a First Year Language Course: Engaging Ways to Teach Humanities Skills to German-Engineering Students."

2. For the supplement to this print publication, see the *Humanities Commons* group Foreign Language Teaching and the Environment (hcommons.org/groups/foreign-language-teaching-and-the-environment/). This open repository is intended to provide a mechanism for scholarly networking and dynamic sharing of curricular materials; contributions are welcomed.

3. See also, for example, the praxis-oriented collection *Environment and Pedagogy in Higher Education* (Viakinnou-Brinson) and the STEM-oriented essays in *Deutsch als zweite Bildungssprache in MINT-Fächern* (Tschirner et al.). Given the rapidly changing state of knowledge in this domain, curriculum developers should in addition look to open-access online materials as a vital resource for dynamic content.

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