INNOVATIONS IN TEACHING AND LEARNING
RESEARCH BRIEF 2

Interdisciplinary Undergraduate Education

*CIC Project on the
Future of Independent Higher Education*

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About the Project on the Future of Independent Higher Education

CIC's Project on the Future of Independent Higher Education is a multi-year initiative to identify and examine the forces that are most likely to affect the future of independent colleges and universities and to help member institutions prepare for both new challenges and new opportunities. With the guidance of a steering committee of college and university presidents (see page 15), the project considers potentially disruptive changes to American society and education and explores fresh approaches to higher education and new college business models. The project also examines the distinctive characteristics and missions of independent colleges that have enabled them to offer a high-quality education for so many years. The project is supported by the Lumina Foundation for Education and the TIAA-CREF Institute.

Other Reports in This Series

This Research Brief is the second in a series of short papers on innovations in pedagogy and curriculum that may enhance student learning at independent colleges and universities. Each brief includes a review of recent literature, examples of how the innovation has been adopted by CIC members, discussion questions for further exploration, and recommendations for additional reading. The principal author is Philip M. Katz, CIC's director of projects.

Research Brief 1: *Competency-Based Education* (April 2015)

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The Council of Independent Colleges (CIC) is an association of 750 nonprofit independent colleges and universities and higher education affiliates and organizations that has worked since 1956 to support college and university leadership, advance institutional excellence, and enhance public understanding of private higher education's contributions to society. CIC is the major national organization that focuses on providing services to leaders of independent colleges and universities as well as conferences, seminars, and other programs that help institutions improve educational quality, administrative and financial performance, and institutional visibility. CIC conducts the largest annual conference of college and university presidents. CIC also provides support to state fundraising associations that organize programs and generate contributions for private colleges and universities. The Council is headquartered at One Dupont Circle in Washington, DC. For more information, visit *www.cic.edu.*

Interdisciplinary Undergraduate Education

KEY POINTS:

- During the most recent decade, interdisciplinary instruction at the undergraduate level has increased rapidly.

- Independent colleges and universities are both innovators in developing new approaches to interdisciplinary education and strong supporters of traditional liberal arts disciplines. Some observers argue that interdisciplinary approaches are better suited to the complexity of the 21st-century world and workplace.

- Significant barriers to interdisciplinarity include institutional inertia, evaluation challenges, the strong commitment of faculty members to the disciplines in which they were trained, and the role of discipline-based departments in curricula and faculty rewards.

- The size, flexibility, and commitment to teaching at smaller independent institutions can make it easier for them to introduce innovative programs in interdisciplinary education.

- Campus leaders can promote and sustain interdisciplinary initiatives by developing and supporting policies that explicitly reward faculty members and departments for interdisciplinary teaching.

Introduction

Interdisciplinary innovations and traditional academic disciplines both thrive at America's independent colleges and universities and cannot be considered completely apart from each other. Indeed, "a serious concern for interdisciplinarity is about as old as the disciplines themselves" (Abbott 2002, 213). This concern has been reflected in waves of curricular experimentation since the 19th century, generally cresting higher in each generation, so that inter-disciplinary programs at the undergraduate level that might have been rare or "adventurous" in the 1950s or even the 1970s "are as common on campuses [today] as fake IDs"—in the lively phrase of Wesleyan University president Michael Roth (Roth 2010). Moreover, each generation has introduced a new vocabulary to describe interdisciplinary curricula, from various "studies" (women's, African American, ethnic) in the 1960s to "integrative studies" in the 1970s and 1980s to "design thinking" in the 21st century (Miller 2015).

Interdisciplinary courses and degree programs are especially common at independent colleges and universities. By the mid-1990s, students at private liberal arts colleges were already more likely to take interdisciplinary courses than their peers at other kinds of institutions, while the faculty members at such institutions were more likely to teach (or team-teach) interdisciplinary courses (Hill 2013, 87). In 2006, a working group convened by the Teagle Foundation and the Social Science Research Council (SSRC) surveyed the institutions then classified as "Baccalaureate College—Liberal Arts" to review the

current state of interdisciplinary education at smaller, mostly private colleges and universities that focus on teaching undergraduates. They found that 60 percent of the institutions in the survey group required at least one interdisciplinary course from their students and 94 percent offered at least one interdisciplinary major. The most common interdisciplinary majors were environmental studies, women's and gender studies, neuroscience/psychobiology, American studies, and biochemistry/molecular biology, followed by several area-studies majors (Rhoten et al. 2006, 6–7).

That year, about one-fifth of liberal arts students at the surveyed institutions graduated with an inter-disciplinary major of some kind. In the period that followed, from 2006 to 2012, the number of bachelor's degrees awarded in "multi- or interdisci-plinary studies" by all U.S. colleges and universities rose by an impressive 49 percent (Snyder and Dillow 2013, Table 322.10), with independent colleges and universities still in the lead. Despite this increase, most interdisciplinary degree programs on campuses remain quite small. "In terms of enrollments," argues Jerry Jones in his recent book, *In Defense of Disciplines*, "interdisciplinarity does not represent the principal competitive challenge to the traditional liberal arts disciplines, but instead it is applied fields, including business, criminal justice, and communications, that have seen considerable expansion in the number of majors" (Jones 2014, 8). Of course, many applied fields, at the undergraduate and graduate levels, are also broadly interdisciplinary.

The growth of interdisciplinary undergraduate programs has not yielded a common, widely-accepted definition of "interdisciplinarity" (Repko 2012, 11–15). Competing definitions tend to fall into two categories: either *comprehensive* definitions that "broadly define ... [interdisciplinarity as any] interaction of two or more different disciplines"; or *distinctive* definitions that emphasize some particular way of bringing together academic disciplines to "produce a cognitive advancement—e.g., explaining a phenomenon, solving a problem, creating a product,

raising a new question—in ways that would have been unlikely through single disciplinary means" (Rhoten et al. 2006, 2–3). "Interdisciplinary" also is used, sometimes interchangeably, to describe research processes, organizational structures, areas of inquiry, new kinds of knowledge or emerging academic fields, and pedagogic approaches that focus on synthesis and integration (Repko 2012, 22–25; Newell 2007). The Association of American Colleges and Universities (AAC&U) Liberal Education and America's Promise (LEAP) initiative incorporates the related concept of "integrative learning," defined as "synthesis and advanced accomplishment across general and specialized skills" and demonstrated by applying "knowledge, skills, and responsibilities to new settings and complex problems" (Flaherty 2015).

Interdisciplinary pedagogy at the undergraduate level usually involves one or more of the following approaches: 1. *Thematic*, in which the methods and insights of more than one discipline are applied separately to a common theme. 2. *Problem-based*, where the focus is on specific real-world problems (such as water pollution or international conflict resolution) or intellectual questions (such as the nature of leadership) that cannot be addressed adequately by one discipline alone. 3. *Comparative*, in which the insights of one discipline are used to critique and sharpen the insights of other disciplines. 4. *Synthetic or integrative*, with a focus on skills, perspectives, and modes of thinking that are not unique to any single discipline. Diana Rhoten and her colleagues argue that "any 'successful' interdisciplinary program—in addition to focusing on critical thinking, problem solving, and analytic skills expected of most liberal arts programs—must develop student capacities to integrate or synthesize disciplinary knowledge and modes of thinking" (Rhoten et al. 2006, 3).

Interdisciplinary education may or may not involve team teaching, but the primary rationale for team teaching is straightforward: "it is the simplest way to ensure that different disciplinary perspectives are accurately and convincingly presented to the

students" (Newell 1983, 11). Effective team teaching has a strong positive impact on both student learning and faculty development, as students and instructors alike must explore multiple perspectives and make new connections (Plank 2013). Team teaching, however, is not necessarily an efficient use of instructional resources. Research shows that successful team teaching typically takes more time than solo teaching, especially during the development of new courses (Plank 2013, 3). Preparing for interdisciplinary team teaching may require additional faculty training and resources, for which external funding is infrequently available (Kezar and Elrod 2012). Finally, team teaching often requires adjustments to faculty workloads and compensation. At some institutions, both instructors receive full teaching credit for a team-taught course, which doubles the faculty costs to offer an interdisciplinary course (Plank 2013, 1; also see Newell 1983, 11–12). At other institutions, instructors may receive credit for a fraction of a team-taught course, or a course may be doubled in size to ensure that each instructor is teaching the equivalent of a normal load, or a course may be divided into smaller discussion sections with relatively little classroom time shared by the team of instructors, or an institution will encourage faculty members to team-teach courses as an overload. Policies for assigning departmental or divisional credit for interdisciplinary courses taught by faculty teams also vary, and can be a point of contention between departments competing for scarce institutional resources.

The most common and compelling argument for interdisciplinarity in all its forms is that the world is becoming more complex and interconnected and that "coping with this complexity will require a new way of understanding—one that does not rely on having only a single viewpoint" (Newell 2007). As Larry Shinn, former president of **Berea College** (KY), has noted,

> we live in an "age of the unthinkable," marked by "unexpected and rapid change." In response,

we must educate ourselves and our students for consequential decision-making in a world of *complex problems* (such as climate change, poverty, and interreligious conflicts) and *rapid change* (such as the collapse of world financial markets in 2008–09 or the rapid and revolutionary rise of information and communication technologies) [Shinn 2012, 16].

Some of the stimulus for interdisciplinary programs, therefore, comes from employers who want workers who can integrate knowledge and skills from multiple fields to help navigate the unpredictable global economy. For example, **Siena College** (NY) recently introduced new interdisciplinary programs that "bring a broader perspective to liberal arts, business, and science education" as an explicit response to the "national conversation that questions the employability of liberal arts majors" (Rogers 2014). Some of the stimulus for interdisciplinary teaching comes from faculty members whose research interests have pushed them to the boundaries of their disciplines. Some comes from academic leaders, who may be interested in both the potential for student learning and the marketing and funding appeal of interdisciplinary programs. Demand from current undergraduates seems to be a less significant factor (Jacobs 2014, 199).

Interdisciplinary Innovations and Disciplines Thrive at Independent Institutions

According to Shinn, independent colleges and universities are especially well suited to develop interdisciplinary curricula because of their tradition of "innovative and integrated student learning and flexible and interdisciplinary institutional structures" (Shinn 2012, 16). In a recent essay chiefly concerned with the future of independent higher education, Wendy Hill, provost of **Lafayette College** (PA), considered why "fostering interdisciplinarity [is] the

right approach for liberal arts colleges." She offered four answers (Hill 2013, 88–89):

1. Interdisciplinarity is "consistent with our history and mission" as teaching-focused institutions.
2. It "adjusts students and faculty from an emphasis—some have suggested an over-emphasis—on a specific major or disciplinary perspective."
3. "Interdisciplinary teaching promotes greater student engagement in learning, enhances the development of higher cognitive skills, fosters more creative thinking, increases sensitivity to ethical issues, and leads to greater tolerance for ambiguity…. [It] creates innovative and holistic knowledge." (This answer neatly summarizes the best current research on student engagement and learning outcomes, which Hill cites.)
4. "Interdisciplinarity is the bridge between the academy and the real world." As tuition-dependent institutions, smaller private colleges are especially responsive to the "real world" demands for new student skills and perspectives that Shinn described above.

Another advantage that smaller private colleges and universities have in developing interdisciplinary curricula is their size. Although they may have access to relatively fewer resources, the faculty members at these institutions also are less likely to be burdened by the kinds of bureaucracy that faculty at research universities "point to … as a major impediment to redefining their scholarly interests" (Hill 2013, 87). But as David Oxtoby, president of Pomona College, observes, "the smaller scale and the ease for faculty members to make connections across the entire institution" does not necessarily make it easier to start and sustain interdisciplinary experiments. Instead, "the smaller scale of our colleges actually can reduce flexibility." This is a matter of both limited personnel and "the local politics of fighting for and retaining faculty positions, which can be threatened if new

faculty members are brought in who cross boundaries and can contribute to core teaching in more than one area" (Oxtoby 2013, 78). Many researchers and academic leaders stress the role of academic leaders in developing policies that explicitly reward faculty members and departments for interdisciplinary teaching.

One popular argument for the superiority of interdisciplinary studies over traditional academic disciplines is summed up in a quip from political scientist Garry Brewer: "The world has problems, but universities have departments"—and departments foster narrow, single-discipline perspectives (quoted in Hyun 2011, 6). A number of prominent scholars from research universities, including Louis Menand (Harvard University), Cathy Davidson (City University of New York), and Mark Taylor (Columbia University), have pushed the argument further in recent years, suggesting that academic departments and the traditional disciplines they represent are outmoded impediments to both research and the curriculum because of their narrowness (Wellmon 2015). "Abolish permanent departments, even for undergraduate education, and create problem-focused programs," Taylor argues, because the future requires "a curriculum structured like a web or complex adaptive network" (Taylor 2009).

Few independent colleges and universities have adopted Taylor's advice. Instead, they appreciate that "interdisciplinarity is fully complementary to the disciplines, embracing them as it draws insights from them" (Newell 2007). Independent institutions that are highly committed to rigorous instruction in traditional arts and sciences also are frequently the most committed to cross-disciplinary education. For example, in a recent essay about STEM education and the liberal arts, Loretta Jackson-Hayes, who teaches chemistry at **Rhodes College** (TN), emphasizes the combination of hands-on research with the writing skills and broad perspectives her students derive from other disciplines. The result is that "employers in every sector continue to scoop up my students because of their ability to apply cross-

disciplinary thinking to an incredibly complex world" (Jackson-Hayes 2015). The challenge, says Wesleyan's Roth, is to "rethink what it means to offer a coherent program in a discipline or a department while we explore the possibilities of … interdisciplinary programs" (Roth 2010).

Original research keeps traditional academic disciplines vibrant at smaller colleges and universities just as it does at large research universities. The fact that undergraduate students at smaller private colleges are more likely to collaborate with faculty members on original research than their peers at other kinds of institutions (CIC 2011, 22) suggests that they receive a more intense experience with both disciplinary norms *and* innovative research across disciplines. In turn, the faculty members at independent institutions who collaborate with student researchers "find skills based in the disciplines to be an essential part of the work they do, even when this work leads them far from their departmental homes" into interdisciplinary teaching (Roth 2010; also see Hill 2013, 87). Perhaps the best evidence that traditional disciplines matter and thrive at independent institutions is that "on a per capita basis there are more [private] liberal arts college graduates obtaining advanced degrees and doctorates than any other institution type … [because] these colleges better prepare students for the levels of thinking required for completing advanced degrees of study" (Jones 2015; also see Rine 2014).

Some Barriers to Interdisciplinarity

Hill argues that smaller private colleges and universities typically possess the "essential collaborative spirit required for interdisciplinarity," but there are still significant barriers to introducing and maintaining interdisciplinary programs (Hill 2013, 92). Faculty size and the internal competition for increasingly scarce faculty resources already have been mentioned. Institutional inertia, a barrier to innovation in general, is an impediment to interdisciplinarity as well (Abbott 2002). The Teagle-SSRC

Working Group emphasized the limitations of standard assessment tools, most of which were developed with traditional disciplines in mind, for the evaluation of interdisciplinary work; as a result, just 30 percent of the colleges in the 2006 survey reported success at assessing explicitly interdisciplinary student learning outcomes (Rhoten, et al. 2006, 12–13). New evaluation frameworks developed in the past decade, such as the National Survey of Student Engagement and the Lumina Foundation's Degree Qualifications Profile, have met just part of the need for better assessment (Kezar and Elrod 2012; Adler-Kassner 2014, 445–447).

Several observers also have noted the institutional temptations to push interdisciplinary courses to one end or the other of the general education curriculum. Thus, "while faculty and academic administrators recognize the value of interdisciplinary teaching and coursework, interdisciplinary courses often become confined to first-year seminar programs or core requirements created because we know they are good for our students." Moreover, because "the lifeblood of a department is its majors … there is an incentive for every department to create a strong, stand-alone introductory course that will attract entering students and get them to commit to further study," often at the expense of interdisciplinary courses for first- or second-year students (Oxtoby 2012, 79). Finally, if the distribution requirements for general education "can be satisfied by narrowly focused disciplinary courses[,] … the senior capstone course essentially bears the full weight of integrating a student's four-year exploration" (Shinn 2012, 20; also see Adler-Kassner 2014).

The most significant barrier to interdisciplinary innovation is often the faculty: how they are trained and socialized in their academic disciplines, how they are hired, and how they are rewarded for disciplinary research and teaching. As Karri Holley argues in her monograph on *Understanding Interdisciplinary Challenges and Opportunities in Higher Education*, there is an "inherent conflict between the professoriate and the university structure related to interdisciplinarity." She concisely summarizes the terms of the conflict:

Traditional faculty responsibilities have historically been organized by disciplinary knowledge domains. Through organizational socialization, beginning during graduate education (if not before) and continuing into the faculty career, professors experience academic life within disciplinary boundaries. The discipline provides the academic's primary cognitive, social, and cultural tools through which to organize and extend knowledge. Faculty reward and recognition structures are framed in disciplinary terms. These structures influence faculty behavior in terms of writing, conference presentations, and other research activities. Departmental and tenure policies, for example, measure an academic's productivity by the degree to which the work produced furthers the understanding of the disciplinary community (Holley 2009, 75–76; also see Abbott 2002; Taylor 2009; Hyun 2011, 7).

Countering these divisive forces may require "dramatic … [changes to] how faculty are organized and rewarded and how curricula are organized and presented" (Shinn 2012, 21). In terms of institutional policies, Hill recommends "actively recruiting faculty … with collaborative and interdisciplinary interests"; specifying the importance of interdisciplinary research and teaching in promotion, tenure, and merit pay policies; and addressing faculty "concern about the impact on a department of teaching courses 'outside' the department." Her own institution addresses the final concern through memoranda of understanding that are explicit about the "timeline and responsibilities" for teaching outside a department (Hill 2013, 89–91).

Additional recommendations come from investigators involved in Project Kaleidoscope (PKAL), an initiative to promote interdisciplinary teaching and learning in STEM fields. From 2007 to 2010, a consortium of 28 colleges and universities (nearly half of them CIC members) participated in a project facilitated by PKAL, "Facilitating Interdisci-

plinary Learning." The premise of the project was "that higher education institutions will not create the innovative and complex thinkers of the future unless campuses reshape their processes and policies." The project yielded five practical strategies for overcoming faculty resistance and other barriers to interdisciplinary innovations:

1. "Start by articulating a common understanding of interdisciplinary learning goals that will drive the cycle of curricular innovation, development, assessment, and improvement."
2. "Use assessment to connect those goals with program structure, content, and pedagogy, paying attention to students as individual learners…."
3. "From within and with new hires, build a critical of mass of faculty and staff who assume leadership responsibility … [for] shaping interdisciplinary curricular and co-curricular approaches…."
4. "Incorporate interdisciplinary program needs into the processes of campus governance and the distribution of resources: money, personnel, equipment, and spaces."
5. "Align interdisciplinary learning with the institutional vision, mission, and identity, and include it in strategic planning at all levels" (Kezar and Elrod 2012, 17).

These lessons are not, of course, limited to STEM.

Examples of Interdisciplinarity at Independent Colleges and Universities[*]

Interdisciplinary teaching at independent institutions takes many forms, including undergraduate majors and minors, general education programs structured around interdisciplinary themes, faculty-student

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Except where noted elsewhere, the descriptions of academic programs in this section are based on information from the institutions' public websites.

research teams devoted to real-world interdisciplinary problems, and dedicated institutes or centers.

North Central College (IL), for example, promotes a "commitment to the philosophy of interdisciplinary studies that began in the 1970s." All undergraduates take at least one interdisciplinary course, and many of them select popular interdisciplinary majors such as integrative media studies, which "pulls courses from computer science, art, English, journalism, and broadcast communications" ("Academics without Borders" 2014). **Lafayette College** (PA) offers 14 interdisciplinary majors and ten interdisciplinary minors in such fields as Africana studies, environmental science, and computational methods, and nearly 10 percent of students choose one of these majors. Since the 2008–2009 economic downturn, the number of interdisciplinary courses has risen steadily as part of an institutional commitment to interdisciplinary teaching and faculty collaboration (Daniels 2012). In 2010, **Allegheny College** (PA) introduced a new strategic plan that committed the college to "build on the strength of its disciplinary majors to create new interdisciplinary programs reflective of the need in today's society to connect, synthesize, and transfer knowledge"; it now has 16 interdisciplinary programs. Each of the institutions mentioned here has fewer than 2,800 undergraduate students.

Many institutions also allow undergraduates to develop their own interdisciplinary majors. For example, students in the Individually Designed Interdisciplinary Program at **Emerson College** (MA) pursue majors with "an anchoring concept or theme" under the guidance of an advisory team of two faculty members from different disciplines. Recent majors include "Global Activism and Advocacy" and "Effective Marketing through Digital Media Design." The program is coordinated by the college's Institute for Liberal Arts and Interdisciplinary Studies, which also promotes interdisciplinary faculty research, hosts co-curricular activities, and "facilitate[s] cross-fertilization between liberal studies and Emerson's professional programs" (Emerson College 2014, 11).

Wheaton College (MA), with an undergraduate enrollment of about 1,600, offers examples of two more approaches to bridging the individual disciplines. In 2001, the college pioneered a general education "Connections Curriculum" that requires students to complete several sets of coordinated courses that are related by a common theme but taught separately (see LeBlanc, Armstrong, and Gousie 2010). The students can chose from such themes as "Body, Form and Motion" (pairing human anatomy and figure drawing classes), "Genes in Context" (pairing bioinformatics and philosophy courses), or "Madness in Medicine and Society" (combining courses in English, anthropology, and psychology). In 2013, the college inaugurated the Wheaton Institute for the Interdisciplinary Humanities, where a pair of faculty directors and a cohort of student fellows collaborate on a common theme that is explored through year-long courses; co-curricular activities such as conferences, performances, panels, and guest lectures; and "real world activities." The theme for 2014–2015 was "Goya and Beethoven: Finding a Voice Out of Silence" and the applied activity was organizing, curating, and promoting a museum exhibit. According to one student, it was "quite a ride, but experiential, interdisciplinary learning ... has proven itself to be far more poignant than simple classroom learning." The instructors also reported being "recharged and reinvigorated" by the team teaching (Manning 2015, 18, 24).

The McMaster School for Advancing Humanity at **Defiance College** (OH) is a concrete expression of the institution's faith-based mission, which emphasizes the "spirit of global service" and "opportunities for students to initiate and facilitate beneficial action." The McMaster School, founded in 2002, does not offer formal courses but instead facilitates projects designed to address complex real-world problems in specific locations, such as the impact of logging on agricultural communities in Belize or the training needs of teachers in Cambodia. Each year faculty members propose projects that can be undertaken by research teams of one to three faculty

members and six to 12 students majoring in various disciplines. The research teams work as interdisciplinary learning communities, with the students developing individual research projects that support the common project. The year-long experience includes an on-site field experience of several weeks preceded and followed by two-hour weekly meetings to prepare for the field and then "reflect and analyze after the trip." The result, according to Mary Ann Studer, dean of the McMaster School, is "deep learning," "a more complex understanding of the world," tangible benefits for the partner communities abroad, and a stronger commitment to interdisciplinarity across the campus (Studer 2009).

Dominican University of California offers an example of how an interdisciplinary research framework ("Big History") can be used to reshape a general education program. The idea of Big History was introduced by David Christian at Australia's Macquarie University in 1989. The scope of the framework is immense, embracing 13.7 billion years of natural and human history from the Big Bang through the near future and drawing upon the disciplinary insights of historians, astronomers, physicists, geologists, biologists, and others. Since being introduced, Big History has generated academic and popular books, university chairs, television series, a popular TED talk, and a K–12 curriculum endorsed by Bill Gates, but relatively few courses at the undergraduate level prior to 2010 (Brown 2010; Pitchford and Behman 2014). According to Cynthia Stokes Brown, the pioneer in teaching the subject at Dominican University, instructors at most other colleges and universities were intimidated by its scope and the fact that Big History did "not fit into the departmental structure" or the typical faculty rewards structure (Brown 2010, 9).

This did not deter Brown and her colleagues, who believed that Big History is "inherently trans-disciplinary," asks big questions and demands big answers, encourages synthesis, and offers a powerful scaffold for contextualizing subsequent learning—all necessary elements for an effective first-year

experience (Behmand and Castner 2012). They also believed that smaller private institutions like Dominican have the "size and flexibility to bring an innovative—even transformative—program to campus" (Pitchford and Behmand 2014, 11). Thus, in 2010 the university introduced a year-long sequence of Big History courses, including a seminar in the first semester that participating faculty teach from a common syllabus and a choice of complementary discipline-based courses in the second semester.

Several factors have contributed to the overall success of this initiative, which may serve as a model for introducing interdisciplinary innovations at other institutions:

1. "Significant time and funding" for faculty development, a necessity since every participating instructor is teaching outside of his or her own discipline at some point. The week-long summer institutes developed for Dominican University faculty members have been so successful that they are now open to outside instructors who want to introduce Big History at their own institutions.
2. Intentional efforts to align the program objectives, student learning outcomes, and institutional mission under the leadership of the chief academic officer.
3. "Engagement with faculty leadership … [to] address issues of displacement and territory."
4. Faculty incentives, including "reassigned time, campus-wide acknowledgement, travel funds, [and] aligned tenure and promotion polic[ies]."
5. "Ongoing meaningful assessment with continuous quality improvement" (Pitchford and Behmand 2014, 17).

The assessments demonstrate that the Big History curriculum is meeting many of the intended student learning outcomes. According to the project directors, "students [have learned] to ask questions about the larger implications of their studies, and absorb and analyze new information more critically

and introspectively" (Behmand and Castner 2012). Focus groups with students, however, indicate that some of them "have difficulty seeing the relevance of the factual content" and struggle to connect Big History with the disciplinary content of their eventual major (Cabrera et al. 2014).

The "College of Transdisciplinarity" at **Woodbury University** (CA) is an example of how interdisciplinary perspectives can become institution-alized at independent colleges and universities. In 2005–2006, the small College of Arts and Sciences at Woodbury—then and now an institution with a strong emphasis on professional and undergraduate programs in architecture, design, and business—faced the prospect of being demoted to a service department for general education courses. Instead, after an intensive strategic planning process, the college was reorganized as an Institute of Transdisciplinary Studies (ITS) and charged with the task of helping to integrate liberal and professional education at the university (Cremer 2007; Clevenger 2014). Key to this transformation was the self-conscious embrace of "transdisciplinarity," a variant on "interdisciplinarity" with roots in the development psychology of Jean Piaget that stresses collaborative research, "real-world engagement, and constructive problem-solving" (Cremer 2007; Hyun 2011, 8). In the decade that followed, ITS and its founding director, Douglas Cremer, promoted a flexible approach to holistic course design that "scrapped the traditional surveys and went whole-hog into a comparative, interdisciplinary curriculum" (Cremer quoted in Clevenger 2014, 7). The ITS approach was so effective that in 2014 it was reorganized as the College of Transdisciplinarity with equal status to the Colleges of Architecture, Business and Media, and Culture and Design. "Transdisciplinarity" also has been adopted as one of four fundamental educational principals for the entire institution, along with design thinking, entrepreneurship, and civic engagement.

Berea College offers a final example of how interdisciplinarity might help shape the future of independent higher education by providing a rationale for the more efficient use of instructional resources. In 2011, after extensive consultation with the faculty and campus community, Berea abolished its existing academic departments and replaced them with six multidisciplinary divisions. According to Shinn, who was president at the time, this move "fundamentally challenges a more than century-old disciplinary/departmental paradigm in American higher education," though a number of other small institutions already operate through divisional structures (Shinn 2012, 18; also see Stripling 2010; Pearce 2014). The restructuring was prompted by the 2008–2009 financial crisis, which hit Berea, which does not charge tuition, especially hard. A small scenario-planning taskforce composed of faculty, staff, and administrators was charged with developing proposals that would reduce costs as much as possible while remaining true to the institutional mission to provide low-income students with a high-quality, tuition-free liberal arts education. The taskforce came back with three proposals that shared a common feature: replace departments with divisions. Importantly, "the case was made mainly on educational grounds," with the argument that such a restructuring would promote "(a) excellence, flexibility, and innovation in Berea's faculty and curriculum, (b) opportunities for increased faculty oversight of the whole curriculum, and (c) flexibility and cost management in the faculty and academic units' budgets while continuing tenure" (Shinn 2012, 19). In addition to its budgetary benefits, the restructuring has indeed led to an increase in interdisciplinary teaching, more explicit attention to interdisciplinary pedagogy, and the inception of new divisional identities that "complement, never supersede" disciplinary identities. But the long-term impact of the change remains unclear (Pearce 2014).

Questions to Consider

Leaders of independent colleges and universities may want to consider the following questions about the introduction and support of interdisciplinary approaches to undergraduate education:

- For most institutions, the question is not *whether* to introduce interdisciplinary programs but "how best to structure these opportunities and ... measure their success" (Rhoten et al. 2006).

- What is the best mix of interdisciplinary and disciplinary instruction to achieve the desired student learning outcomes? What is the best way to evaluate the student learning outcomes of interdisciplinary education?

- Is general education the most appropriate curricular location for interdisciplinary education at your institution? Should interdisciplinary education in the liberal arts be seen or treated differently from undergraduate education in such professional fields as education, business, or nursing, which already typically incorporate multiple disciplines? Are interdisciplinary specializations, such as environmental biology or international relations, best studied in graduate school after majoring in a traditional academic discipline, such as biology or political science, at the undergraduate level?

- "How should institutions approach the calculation and allocation of resources for interdisciplinary programs? What are the decision-making criteria? Does the introduction of interdisciplinary activities lead to resource competition or resource sharing?" (Rhoten et al. 2006, 21) Note that interdisciplinary innovations can have an impact on institutional resources as diverse as library acquisitions, the allocation of teaching and office space, and the design of new academic buildings (Cotton and Johnson 2015).

- Is there a potential conflict between interdisciplinary curricular initiatives and existing institutional approaches to faculty hiring, faculty governance, program funding, or promotion and tenure? What policies would be most effective to recognize and reward faculty members and departments for interdisciplinary teaching?

- Is team teaching a necessary or desirable component of interdisciplinary education at your institution, whether for general education courses or upper-level courses? If so, what policies and resources may be required to encourage team teaching and manage its expense?

- Which stakeholders—faculty, students and their families, alumni, board members, donors, the potential employers of your graduates—consider traditional academic disciplines to be an essential element of the undergraduate education at your institution? Which, if any, consider interdisciplinary education to be essential to the future of your institution? How can interdisciplinarity support the mission of your institution? To what extent are interdisciplinary programs, present or proposed, about marketing and admissions rather than offering a solid education in the liberal arts?

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Suggestions for Further Reading

The Association for Interdisciplinary Studies (*www.oakland.edu/ais*) was founded in 1979 "to promote the interchange of ideas among scholars and administrators in all of the arts and sciences on intellectual and organizational issues related to furthering integrative studies." The website includes extensive resources on the scholarship of interdisciplinary teaching and learning.

Wendy L. Hill, "Interdisciplinary Perspectives and the Liberal Arts," in *Remaking College: Innovation and the Liberal Arts*, edited by Rebecca Chopp, Susan Frost, and Daniel H. Weiss (Baltimore, MD: Johns Hopkins University Press, 2013), 85–95. Includes a strong argument for the unique capacity of liberal arts colleges (primarily smaller private institutions) to develop interdisciplinary programs and an overview of relevant literature on student learning outcomes.

Karri A. Holley, "Understanding Interdisciplinary Challenges and Opportunities in Higher Education," *ASHE Higher Education Report* 35, no. 2 (2009). A detailed review of the barriers to interdisciplinarity.

Adrianna Kezar and Susan Elrod, "Facilitating Interdisciplinary Learning: Lessons from Project Kaleidoscope," *Change: The Magazine of Higher Learning* 44:1 (Jan.–Feb. 2012), 16–25. *www.changemag.org/Archives/Back%20Issues/2012/January-February%202012/Facilitating-learning-full.html*. Lessons from a multi-year national initiative to promote institutional collaborations around interdisciplinary STEM education.

Diana Rhoten, Veronica Boix Mansilla, Marc Chun, and Julie Thompson Klein, "Interdisciplinary Education at Liberal Arts Institutions," *Teagle Foundation White Paper* (New York, NY: The Teagle Foundation, 2006). This is the most comprehensive report on the subject available.

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