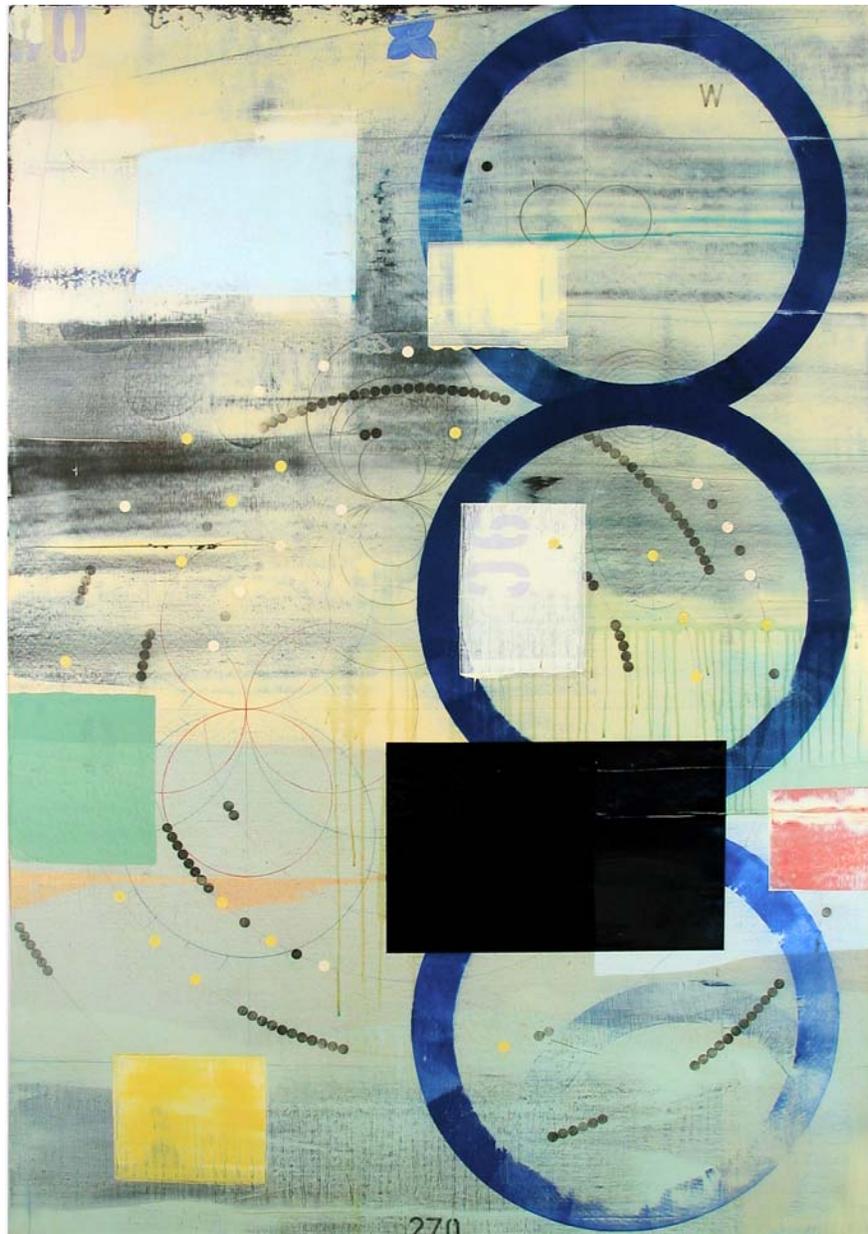


Interdisciplinary Education at Liberal Arts Institutions

Teagle Foundation White Paper

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Navigator 2, David Collins (2000)

EXECUTIVE SUMMARY

One of the “catch fire” ideas of 21st century liberal arts education has been the renewed enthusiasm for interdisciplinarity. At ever growing rates, students are pursuing courses at the interfaces of disciplines, seeking to broaden their educational experience by gaining “requisite” knowledge and skills in one or more fields beyond their primary majors. Likewise, faculty are increasingly engaging in more research and teaching activities that cut across multiple departments, looking to learn the languages, cultures, methods, and knowledge of their colleagues. In this context of expanding popularity, different types of interdisciplinary programs are diffusing across liberal arts colleges and universities. And, while there is some consensus about what are – or *should be* – the goals of such programs, there is less agreement about how best to structure these opportunities and even less about how to measure their success.

Ideas about interdisciplinary programming range from majors and minors, to centers and institutes, to courses and colloquia. In some cases, interdisciplinary offerings are formally structured, requiring significant student and faculty commitment by emphasizing a set of key requirements that act as the core of undergraduate training. In others, interdisciplinary opportunities are more loosely organized, affording wide latitude to students and faculty in terms of how they participate, when, and with what level of investment. Some scholars, practitioners, and policy makers celebrate this eclectic nature of interdisciplinarity; others lament the implications such variation poses for the assessment of interdisciplinary education.

Today, the lack of generalizable methods for judging interdisciplinary education and its direct impacts on student learning is the biggest challenge to interdisciplinarity, particularly at the undergraduate level (Klein, 1996; Lattuca, 2001). Anecdotal evidence suggests that interdisciplinary programs and activities most often rely on the same assessment approaches used by their disciplinary and departmental siblings (e.g., grades, surveys, standardized tests). This default rather than design strategy of interdisciplinary assessment suffers from proxy criteria that “sidestep the question of what constitutes interdisciplinary knowledge” (Boix Mansilla and Gardner, 2003) and from a lack of well-articulated measures by which to capture interdisciplinary learning.

The Teagle – SSRC Working Group on Interdisciplinary Education at Liberal Arts Institutions was formed to explore this issue, with an eye toward informing the design of an empirically-grounded and action-oriented framework to assess interdisciplinarity in the liberal arts context. Comprised of 21 higher education researchers and administrators, the Working Group met twice between April 2005 and April 2006. Discussion centered around identifying: (a) workable definitions and distinctions of ‘interdisciplinary’ education in the context of the liberal arts education; (b) common modes of interdisciplinary education programming and methods of interdisciplinary learning assessment; (c) and, (d) possible performance-based and value-added approaches to assess interdisciplinary learning in of assessment for liberal arts institutions.

To move this discussion beyond anecdotal accounts and ground it in empirical evidence, in the interim months the Working Group surveyed the population of institutions identified as “Baccalaureate College – Liberal Arts” under the 2000 Carnegie Classification system. It also conducted semi-structured interviews with frontline faculty and administrators involved in interdisciplinary programs at the eight schools represented in the Working Group. Together, the survey and interview data have been used to map the different ensembles of interdisciplinary education programs and assessment practices in liberal arts colleges and universities nationwide, to analyze differences in the meanings and mechanics between these various ensembles, and to explore possible assessment alternatives for the future. The ensuing White Paper provides a summary of these discussions and data analyses.

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INTRODUCTION

Voices from different corners of academe advocate the importance of interdisciplinarity, arguing that many of today's pressing questions in areas such as the environment, health, technology, global security, and urban culture demand the cross-fertilization of disciplinary skills, theories, methods, and ideas (see for example, AACU, 1999; Colwell, 2003; NAS, 2004; NRC, 2000; Rustum, 2000). And, recent reports from government and industry corroborate the call, emphasizing the need for Ph.D.'s, M.A.'s, and B.A.'s who can integrate and elaborate knowledge from varied fields, communicate and collaborate with diverse stakeholders, and operate in and navigate between cross-functional and cross-sectoral teams (see, for example, Business-Higher Education Forum, 1999; COSEPUP, 1995; The New York Times Job Market, 2002).

In response, colleges and universities have implemented myriad new initiatives designed to prepare students for interdisciplinary worlds of scholarly research, professional work, and civic responsibility. At the graduate level, there has been a dissemination of well-known publications such as the 1995 COSEPUP report entitled *Reshaping the Graduate Education of Scientists and Engineers* as well as widespread initiatives such as the Integrative Graduate Education and Research Training (IGERT) program. At the under-graduate level, as documented in *Greater Expectations: A New Vision for Learning as a Nation Goes to College* (2002), practices such as first-year seminars, learning communities, capstone experiences, student portfolios, and, of course, interdisciplinary studies majors have become common campus features.

The best liberal arts colleges are places where the conversation is fundamentally interdisciplinary, where disciplinary borders are crossed for the sake of enriching and deepening inquiry and research, and where different disciplinary perspectives challenge and supplement one another.

Liberal Arts at Work,
Albion College

The appreciation of interdisciplinarity is not entirely new to liberal arts education. It was the philosopher Seneca, ruminating on Socrates' idea that the examined life is the best preparation for citizenship, who gave rise to the modern concept of liberal education. The connotation of *liberalis* favored by Seneca held that education should produce citizens who could call their minds their own through study of the subjects and methods best suited for enlightened decision-making. That idea and the ancient Greek values of synthesis and developing the "whole person" became part of the legacy of integrative values in humanities, liberal education, general education, and many programs of interdisciplinary studies. Thus, as Mary Taylor Huber and Pat Hutchings remind us: "At the heart of liberal education lies the idea that learning should be greater than the sum of its parts. Resonant with the classical tradition of educating the 'whole' person, liberal education has historically encouraged 'breadth of outlook, a capacity to see connections and hence an ability to make fundamental decisions and judgments'" (Huber and Hutchings, 1993: 28).

If we accept interdisciplinarity as both current and core to liberal education, then a – if not, *the* – primary responsibility of liberal arts colleges and universities should be to ensure not just that students pursue interdisciplinary activities in more intentional ways but that they in fact acquire intended interdisciplinary skills as a result.

Definitions and Notions of Interdisciplinarity

There is no single, widely accepted definition or model of interdisciplinarity. So, what qualifies an educational program as “interdisciplinary” or its graduates as “interdisciplinary”? What demonstrates interdisciplinary learning, and how do we distinguish that from disciplinary learning? Thinking about interdisciplinarity requires grappling with the dual overriding concerns of:

What to assess? Identifying, defining, and specifying what one is looking for when discussing “interdisciplinarity” and what makes interdisciplinary education distinct from disciplinary, general, or liberal arts education.

How to assess? Selecting, modifying, or altogether creating valid and reliable indicators and instruments to capture and measure both processes and outcomes associated with interdisciplinary education.

Varied definitions of interdisciplinarity can be found in the literature (see, for example, Boix Mansilla, 2005; Gibbons et al, 1994; Kahn and Prager, 1994; Klein, 1996; 2002; Kockelmans, 1979; Lattuca et al., 2004; Nissani, 1997; Salter and Hearn, 1996; Weingart and Stehr, 2000). Below we examine some select notions of interdisciplinarity in an effort to move toward a working definition of interdisciplinary education and a preliminary operationalization of interdisciplinary learning outcomes.

The issues involved in defining “interdisciplinarity” are similar to those encountered when attempting to define other big ideas in education such as, for example, “liberal arts,” “multiculturalism,” or “service learning.” In each case, there are advocates of “big tent” (i.e., comprehensive) versus “small tent” (i.e., distinctive) definitions. As a “big tent” concept, interdisciplinarity is broadly defined as the interaction of two or more different disciplines, subsuming the ideas of cross-disciplinarity, multidisciplinary, and transdisciplinarity. As a “small tent” idea, interdisciplinarity takes its place as just one of many distinct ways of bringing together disciplines. In this camp, for example, *multidisciplinarity* often implies the *inclusion* of a broad range of discipline-based theories, skills, data and ideas, whereas *interdisciplinarity* would be said to insist on their *integration* (Rhoten, 2004).

Working with the “small tent” conceptualization of interdisciplinarity, various scholars have applied the notion of “integration” to define different facets of interdisciplinarity, including research, work, and teaching. For example, a National Academies of Science Committee on Facilitating Interdisciplinarity recently defined **interdisciplinary research** as “a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and or theories from two or more discipline or bodies of knowledge to advance fundamental understandings or to solve problems whose solutions are beyond the scope of a single discipline or area on research practice” (NAS, 2004). Along similar lines but with more granularity, Lattuca, Voigt, and Faith (2004) argue that **interdisciplinary teaching** can be more than just “the integration of existing disciplinary perspectives ... sometimes combining disciplines [*synthetic interdisciplinarity*] ... other times critiquing [*conceptual interdisciplinarity*] and/ or transcending [*transdisciplinarity*] the disciplines” (Lattuca et al., 2004: 25).

Typology of Disciplinary Teaching

Informed Disciplinary. Focuses instruction primarily on a single discipline but call upon other disciplines to illuminate course content.

Synthetic Interdisciplinarity. Combines theories, concepts, and perhaps even research methods from different disciplines; but the contributing disciplines remain clearly identifiable, revealing relatively bounded content areas and perhaps distinctive methods of inquiry.

Transdisciplinarity. Mutes the disciplinary sources of theories and methods, applying them across disciplines so that they are no longer associated with a single discipline or field. Transdisciplinary concepts, theories, and methods are tested in one discipline, then another.

Conceptual interdisciplinarity. Includes disciplinary perspectives but has no compelling disciplinary focus. Conceptual interdisciplinarity also accommodates poststructural, postmodern, and feminist forms of inquiry, which explicitly critique the disciplines and may contend that *all* questions require interdisciplinary answers.

Lisa Lattuca
Creating Interdisciplinarity

learning is, as Klein points out, “neither a subject matter nor a body of content. It is a process for achieving an interpretive *synthesis*, a process that usually begins with a problem, question, topic, or issue” (1990: 188). Going one step further, Boix Mansilla (2005) elaborates **interdisciplinary understanding** as “the capacity to integrate knowledge and modes of thinking in two or more 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. ... the *integration* of disciplinary perspectives is a means to a purpose, not an end in itself” (Boix Mansilla, 2005: 15).

In devising Table 1, we further examined the literature to identify the expected outcomes of liberal arts and interdisciplinary education. Our search revealed a number of notable parallels between the two as many interdisciplinary programs tend to posit goals associated with general and liberal education, including, for example, intellectual multiplicity, discovery-orientation, diffuse skills, and complex and ambitious goals (Farmer and Napieralski, 1997). Furthermore, reports such as *Liberal Education Outcomes: A Preliminary Report on Student Achievement in College* (AACU, 2005) and *Taking Responsibility for the Quality of the Baccalaureate Degree* (AACU, 2004) identify explicit overlaps in the goals of liberal arts and interdisciplinary education, particularly in the areas of “Integrative Learning” and “Breadth of Knowledge.” Thus, based on the literature and our working definition derived from it, we 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. (See Table 1 for expected outcomes of liberal arts education and interdisciplinary education).

Borrowing from each of these conceptualizations, we have derived the following working definition for **interdisciplinary education**: ‘a mode of curriculum design and instruction in which individual faculty or teams identify, evaluate, and integrate information, data, techniques, tools, perspectives, concepts, and or theories from two or more disciplines or bodies of knowledge to advance students’ capacity to understand issues, address problems, appraise explanations, and create new approaches and solutions that extend beyond the scope of a single discipline or area of instruction.’ This or some close variation of this notion of interdisciplinary education would then suggest that **interdisciplinary**

Table 1

Liberal Arts Education	Interdisciplinary Education
Thinking critically, or possessing broad analytic skills	Tolerance of ambiguity or paradox
Learning how to learn	Sensitivity to ethical dimensions of issues
Thinking independently	<i>The ability to synthesize or integrate</i>
Empathizing, recognizing one's own assumptions, and seeing all sides of an issue	Enlarged perspectives or horizons
Exercising self control for the sake of broader loyalties	Creativity, original insights, unconventional thinking
Showing self assurance in leadership ability	Critical thinking
Demonstrating mature social and emotional judgment; personal integration	A balance between subjective and objective thinking
Holding equalitarian, liberal, pro science, and antiauthoritarian values and beliefs	An ability to demythologize experts
Participating in and enjoying cultural experience	Increased empowerment
<i>(Winter et al., 1981)</i>	<i>(Field et al. 1994 in Klein, 2002)</i>

If we accept synthesis and integration as the hallmarks of interdisciplinarity, and thus the goals of interdisciplinary learning, how do we proceed to distinguish, capture, and measure these as student outcomes alongside those of liberal arts learning? How does one recognize, evaluate, and encourage these outcomes? Are there leading indicators of synthesis that would allow early identification and promotion of such learning, thinking, and understanding? Possible approaches to assessing interdisciplinary programs might be developed by adopting and/or adapting an array of existing assessment strategies, ranging from those focused on indirect student measures (surveys, focus groups, interviews) to others concerned with direct student measures (standardized instruments, locally developed tests). However, many of these conventional assessment approaches tend to focus on single measures or reductionist strategies and to evaluate specific skills and abilities. As a consequence, they may not be well suited to measure the complexity, ambiguity, and multiplicity of skills and aptitudes involved in the creation of new meanings, explanations, or solutions via interdisciplinary synthesis and integration.

Performance-based and value-added assessment approaches may offer some new avenues for the assessment of interdisciplinary programs. Examples of how these methods might apply to interdisciplinary assessment have been developed by working group members and will be discussed in a later section of this paper, after reviewing empirical evidence pertaining to the current state of interdisciplinary programs and assessment practices across liberal arts colleges and universities.

WORKING GROUP DATA AND METHODS

The SSRC formed a working group of 21 higher education researchers and liberal arts leaders with expressed interests in interdisciplinary education and/or expert skills in student assessment. (See Appendix 1 for list of working group members.) The deliberately mixed membership of the Teagle – SSRC Working Group created a unique opportunity for institutional leaders to learn about the design and delivery of interdisciplinary programs and assessment practices from one another, as well as for higher education researchers to gather critical insights into institutional contexts and conditions that will advance the analysis of interdisciplinary theory and practice.

The Teagle – SSRC Working Group focused on two central charges: (1) Inventory “interdisciplinary” education programs and assessment practices on liberal arts campuses, and (2) Identify “value-added” indicators and “performance-based” measures that may improve the delivery and evaluation of inter-disciplinarity.

Toward these goals, the Teagle - SSRC working group surveyed the 222 institutions identified as “Baccalaureate College – Liberal Arts” under the 2000 Carnegie Classification system. It also conducted semi-structured interviews with frontline faculty and administrators involved in inter-disciplinary programs at the eight schools represented in the working group. Together, the survey and interview data were used to map the different ensembles of interdisciplinary education programs and assessment practices in liberal arts colleges and universities nationwide, to analyze differences in the meanings and mechanics between these various ensembles, and to explore possible assessment alternatives for the future.

The 222 institutions considered “Baccalaureate College - Liberal Arts institutions” under the 2000 Carnegie Classification system were surveyed between January and March 2006. We received responses from 109 institutions, resulting in a 49.10% response rate. (See Appendix 2 for list of responding institutions.) Each of the five working group researchers conducted follow-up interviews at the working group colleges and universities between February and April 2006.

ANALYSIS AND RESULTS

Population and Sample Attributes

The resulting sample of 109 respondent colleges and universities is representative of the larger population of liberal arts institutions in terms of selectivity, endowment, and enrollment. However, the survey sample is slightly under representative in terms of younger institutions and institutions from the southeast, and it is slightly over representative in terms of institutions reclassified under the 2005 Carnegie Classification system as having an “arts and sciences focus, with no graduate coexistence.” Given that our primary interest is in these types of academically oriented, undergraduate liberal arts institutions, the fact that 50.00% of our sample qualifies as such is seen as a positive. (See Appendix 3 for summary characteristics of population and sample.)

I found the dialogue to be more rewarding than anything I have done for some time with folks from other colleges.

John Strassburger
President, Ursinus College

It is worth noting that our sample may suffer from some self-selection effects and thus could be faintly biased toward liberal arts schools with some comparative advantage in, or relative preference for, interdisciplinarity. For example, based on the 2006 US News College and Universities Rankings, 61.71% of all liberal arts institutions report offering interdisciplinary studies majors. This compares to 71.96% of the colleges and universities in our sample. Moreover, 99.07% of our respondents report being *very* (48.60%) or *somewhat* (50.47%) oriented toward interdisciplinary education at the undergraduate level. None of the institutions indicated being *not at all* oriented toward interdisciplinary education, and less than 1% indicated that they were *not really* interdisciplinarily oriented.

Interdisciplinary Offerings of Sample Institutions

As stated above, essentially all of the institutions in our sample report an orientation toward interdisciplinary education at the undergraduate level. And, looking to the future, 65.42% of the sample expect to increase their interdisciplinary offerings over the next five years, whereas only 32.71% anticipate no increase in their interdisciplinary orientation and none foresee decreasing their interdisciplinary offerings. Interview data suggest that while this interdisciplinary orientation is driven in large part by student interest, its ultimate institutionalization will depend on leadership from top-to-bottom. As one faculty representative from Kenyon stated: interdisciplinary programs are still “personally-driven,” whereas departments are “self-perpetuating.”

Beyond ascertaining whether or not an institution had a general interdisciplinary orientation, we sought to investigate the extent to which the activities characterizing this orientation vary across campuses. First, to get a sense of how interdisciplinarity is structured across liberal arts colleges and universities, we asked respondents to indicate which of the following types of programs are offered at their institution – interdisciplinary majors, interdisciplinary minors or certificates, interdisciplinary institutes or centers, required interdisciplinary courses, or optional interdisciplinary colloquia. Second, to gain some perspective on the nature of academic commitment to interdisciplinarity across the campuses, we also asked them to estimate the rate of student participation in each type of program. (See Table 3 for a summary of the aggregate results.)

Table 2

	Percent of Sample Institutions Offering Activity	Estimated Percent of 2006 Class Participating in Activity (respondent mean)
Interdisciplinary Majors	94.39%	16.60%
Interdisciplinary Minors / Interdisciplinary Certificates	85.19%	10.43%
Interdisciplinary Centers / Interdisciplinary Institutes	57.00%	19.93%
Required Interdisciplinary Courses	60.20%	100.0%
Optional Interdisciplinary Colloquia	37.00%	45.23%

As one can see from Table 2, more institutions in the sample offer interdisciplinary majors and minors and/or required interdisciplinary courses than either interdisciplinary

centers/institutes or optional interdisciplinary colloquia. Yet, on average, a much higher percentage of students on these campuses appear to participate in interdisciplinary colloquia rather than take up interdisciplinary majors. Given that interdisciplinary majors tend to be the most structured and demand the highest level of academic commitment on the part of students, and interdisciplinary colloquia demand the least, the results in Table 2 may suggest two possible patterns. First, there seems to be a positive relationship between the structural rigidity/academic commitment of a program and its frequency across institutions, which might suggest that institutions are seeking to incorporate interdisciplinary programming into their core educational activities rather than letting them ebb and flow on the margins. Second, conversely, there seems to be a negative relationship between the structural rigidity/academic commitment of a program and its rate of student participation. This is likely just a consequence of ratios – students take more classes than they select majors. The fact that, on average, almost one-fifth of all liberal arts students in our sample graduated in 2006 with an interdisciplinary major – given the number of interdisciplinary to disciplinary majors on these campuses – speaks to the popularity of these programs.

Again, as indicated in Table 2, a significant majority (94.39%) of the institutions in our sample formally offer undergraduate interdisciplinary majors. In total, 61 different interdisciplinary major program foci were identified, ranging from Advertising & Marketing Communication to World Languages. Of these, only eight (13.12%) fall within the natural or physical sciences. The remaining 53 programs are oriented toward the social sciences, arts/humanities, and/or professions, a quarter of which can be classified as international / global or area studies. Looking at the “top 10” interdisciplinary majors, again more than half are international / global or area studies, two follow the “biology plus” model, and the most popular are in arenas often considered “advocacy / activism” fields. (See Table 3 for a list of the “top” 10 interdisciplinary majors across our sample.)

Table 3

“Top 10” Most Frequently Offered Interdisciplinary Majors	Percentage of Institutions Offering Major
Intercultural Studies	13.08%
Latin American Studies	16.82%
African American & Africana Studies	21.50%
International Relations/Studies	28.04%
Asian & East Asian Studies	31.78%
Biochemistry & Molecular Biology	33.64%
American Studies	36.45%
Neuroscience & Psychobiology	36.45%
Women's & Gender Studies	44.86%
Environmental Studies & Science	63.55%

For the most part, the thematic or topical foci of interdisciplinary minors offered by the institutions in our sample mirror those of the interdisciplinary majors, and both tend to represent established scientific or specialty fields in which there are the following: (a) some widespread granting of degrees across academic institutions, (b) a certain degree of

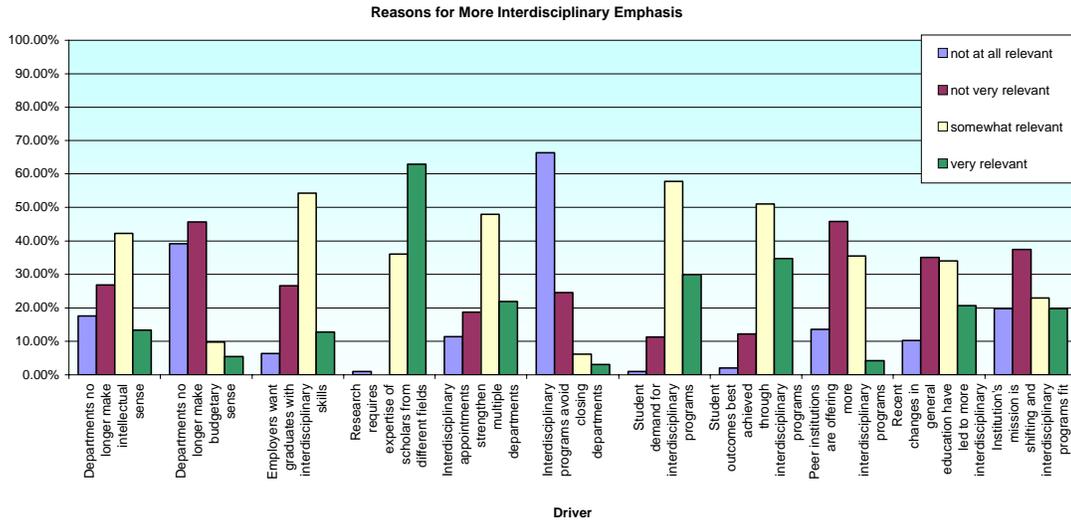
agreement about the provision of knowledge in textbooks and courses of study, (c) some broad proliferation of professional journals and associations, and (d) an identifiable labor market for graduates.

Compared to interdisciplinary majors and minors, the interdisciplinary centers and institutes described by survey respondents are more likely to address research within lesser developed or formalized fields of study and/or to target issues or questions that hold significant cross-over value to academia and civil society. Examples include: Center for Ethical Leadership, Center for Women in Science and Technology, Center for the Study of Race, Ethnicity, and Gender, and Center for Economics, Business, and Public Policy. And, finally, the required interdisciplinary courses reported by respondents seem, on the basis of survey data, to be generically broad and, on the basis of interview, data, to be teachable by different faculty year-to-year, with titles including but not limited to: Introduction to Liberal Studies, Science and Math in Context, Information Literacy, and Conflict and Cohesion. By comparison, the interdisciplinary colloquia appear, again on the basis of survey and interview data, to be either faculty-dependent or student-designed such that their purpose and their presence seem to hinge primarily on the temporal interests of these two stakeholders.

Motivations for Interdisciplinary Education

As stated earlier, essentially all of the institutions in our sample consider themselves interdisciplinarily oriented and two-thirds expect to increase their interdisciplinary offerings over the next five years. In an effort to understand the motivation for this investment, respondents were given 11 possible explanations for why their institutions are expanding their interdisciplinary offerings. Respondents were asked to rate each explanation as *not at all relevant*, *not very relevant*, *somewhat relevant*, and *very relevant*. (See Graph 1 for a comparative relevance of different reasons campuses have for expanding their interdisciplinary emphasis).

Graph 1



By far, the most common motivation for interdisciplinary programs is rooted in research, the argument being that the kinds of questions that “students and faculty are investigating now often require the expertise of scholars from more than one field.” Approximately two-thirds of the respondents in our sample cited this factor as *very relevant* and another one-third claimed it as *somewhat relevant*. Other

Why interdisciplinarity? Well, I hear faculty talking about what animates the students, figuring out the question to ask that motivate the students and get them on a path of inquiry ... that path is often interdisciplinary.

Faculty representative,
Marlboro College

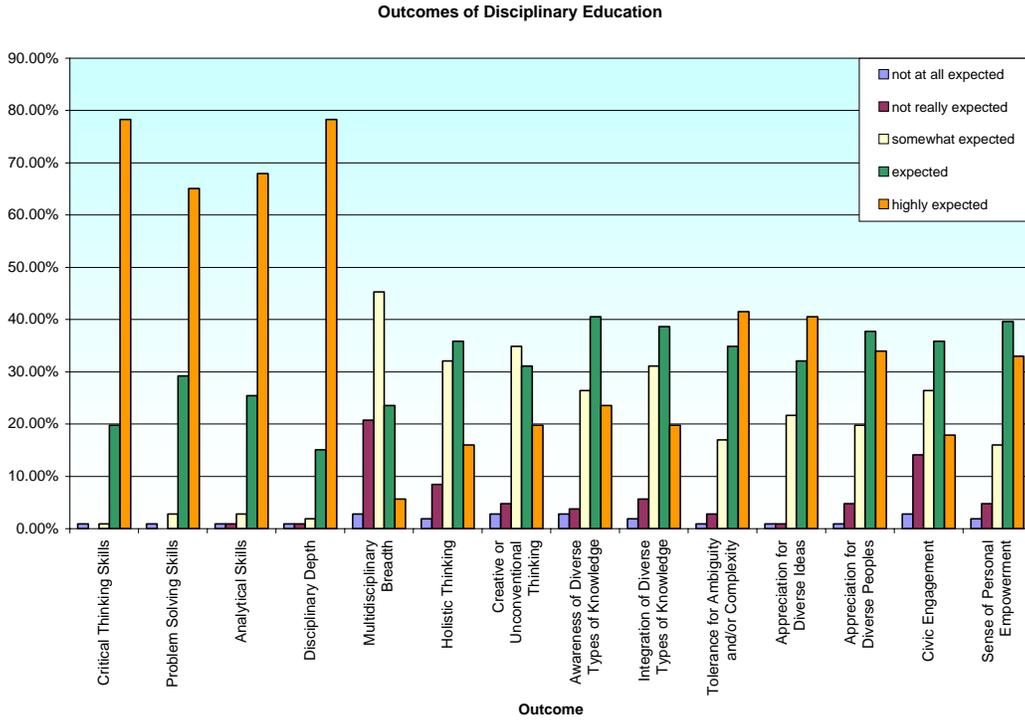
particularly relevant drivers of interdisciplinarity in this sample have to do with student demand and student outcomes. In terms of the former, 87.63% of the institutions claim that “a growing student demand for interdisciplinary programs” is *somewhat* or *very relevant* (57.73% and 29.90%, respectively). In the case of the latter, 85.71% believe that their own “institution’s desired student outcomes are best achieved through interdisciplinary education” is a *somewhat* or *very relevant* source of future interdisciplinary growth (51.02% and 34.69%, respectively).

Interview data and working group discussions also pointed very clearly to the importance of leadership at both the presidential and the trustee levels not only in driving the implementation but also in nurturing the ongoing development of interdisciplinary programs. For example, when asked why the school was expanding its interdisciplinary opportunities, a faculty representative at Albion College responded by saying: “Interdisciplinarity is a presidential priority... the campus leader as the prime catalyst whose commitment to ‘innovative’ approaches is genuine.” Similar sentiments were echoed by all the institutional representatives in the working group. Interviewees and members of the working group raised other influential factors in the motivation and maintenance of interdisciplinary programs at different liberal arts schools, including: the role of institutional size; the interdisciplinary interests and roles of new faculty, the academic, racial, and gender diversity of the student body; and, the real – not simply “rhetorical” – inclusion of interdisciplinarity in the core mission statement of the college or university. These factors correspond with many of the conditions that Irwin Feller identifies as contributing to the variation in interdisciplinary programs by university (Feller, 2004). In the section below, we examine the effects of some of these factors on the structure of and commitment to interdisciplinary education.

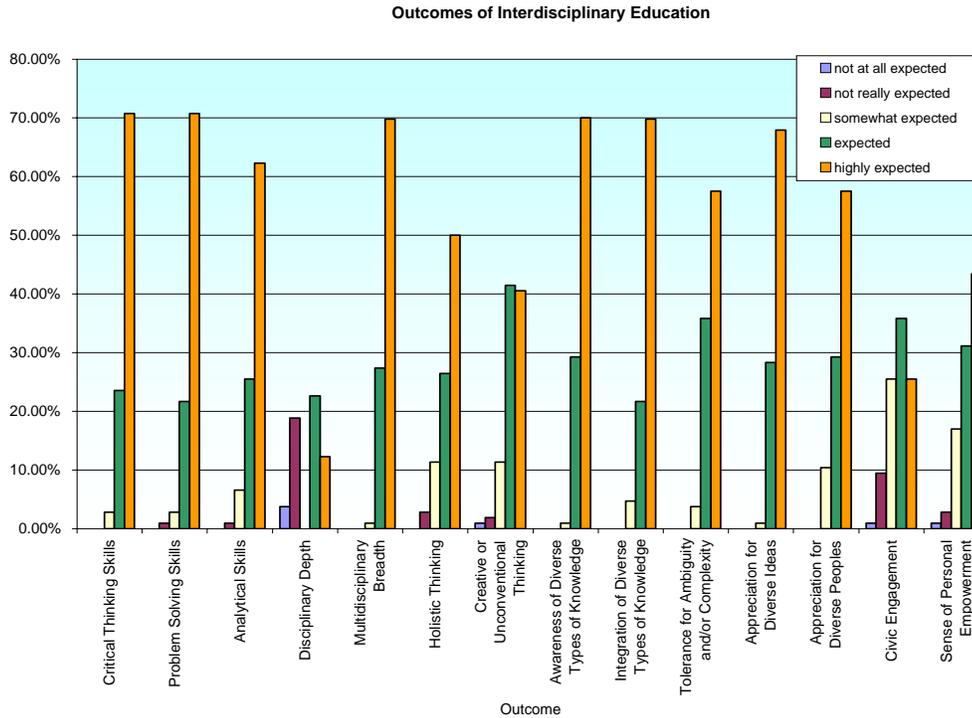
Goals of Interdisciplinary Student Learning

To specify the desired student outcomes that institutions report achieving best through interdisciplinary education, respondents were asked to compare the extent to which their institutions expect – *not all, not really, somewhat, expect, or highly* – each of 12 pre-identified student learning outcomes to be addressed through (a) disciplinary education and (b) interdisciplinary education programs. (See Graph 2 for different expected outcomes related to disciplinary education; See Graph 3 different expected outcomes related to interdisciplinary education.)

Graph 2



Graph 3



The desired student outcomes for interdisciplinary education are “synthesis – the ability to make connections – and integration.”

The goal is “interdisciplinary critical analysis” and problem-solving skills. Students must learn to ask the “right questions” about a complex problem, tease that problem apart, and identify the expertise needed to address the problem. Students are not expected to become experts in each area but rather to know what kinds of expertise exist and can be applied to a given problem.

Faculty representatives,
Ursinus College

(69.81%) as a *highly expected* outcome for interdisciplinary education. However, that only 35.00% of the institutions identify “disciplinary depth” as an *expected* or *highly expected* outcome for interdisciplinary education.

This last result raises some concern. Early research suggests that experience with the basic skills, languages, explanatory models, and objectives of other disciplines are likely to prepare a scientist to be a receptive and productive interdisciplinary collaborator (Roschelle, 1995; Rhoten, 2003). However, there is a growing body of anecdotal and empirical evidence that also suggests that students need both (sub)disciplinary and interdisciplinary training in order to become successful divergent *and* convergent thinkers (NAS, 2004). It is precisely for this reason that many NSF IGERT training programs follow the “discipline plus” model, whereby students gain “deep immersion training in one epistemic form” while also getting exposure to a “shallow end” of expertise in cognate fields to complement and connect their disciplinary knowledge.

In addition to the goals above, which they all reiterated, interviewees and work group members also highlighted “creativity” and “civic engagement” when discussing their institution’s goals for interdisciplinary education. One interviewee commented, for example: “I believe, I want to believe, that interdisciplinary education should enhance the civic spirit of our students, both on and off campus. Does it? I don’t really know.” The idea of civic engagement responds to calls by AACU and the Carnegie Foundation for the Advancement of Teaching to redesign liberal arts education to prepare students for making responsible judgments in their personal, professional, and civic lives. Likewise, in terms of

As the literature might predict, approximately two-thirds of the institutions in the sample considered each of the following student learning outcomes – “critical thinking skills” (78.30% and 70.75%), “problem solving skills” (65.09% and 70.75%), and “analytic skills” (67.92% and 62.26%) – as *highly expected* for disciplinary and interdisciplinary education activities.” Not unsurprisingly, the majority of the institutions also associated “disciplinary depth” (78.30%) as a *highly expected* outcome for disciplinary education versus “multidisciplinary breadth” (69.81%) and “integration of diverse knowledge”

It is a commonplace to say that disciplines are human constructs. They are invented and not given to us by the phenomena of nature or social life. The structures of education tend to channel our imaginations and all too easily lead us to imagine a world that fits our inherited categories. It is important for students to understand, as early as possible, that academic disciplines, useful as they may be for ordering experience and providing tools for inquiry, should not encapsulate. Exciting possibilities exist in the interstices between traditional disciplines; the liberally-educated person should be alert to the opportunities that exist at the fault lines between traditional disciplines, confident in his or her ability to follow questions across boundaries, and alive to the implications of what is done in one field for the development of others.

John Servos,
Amherst College

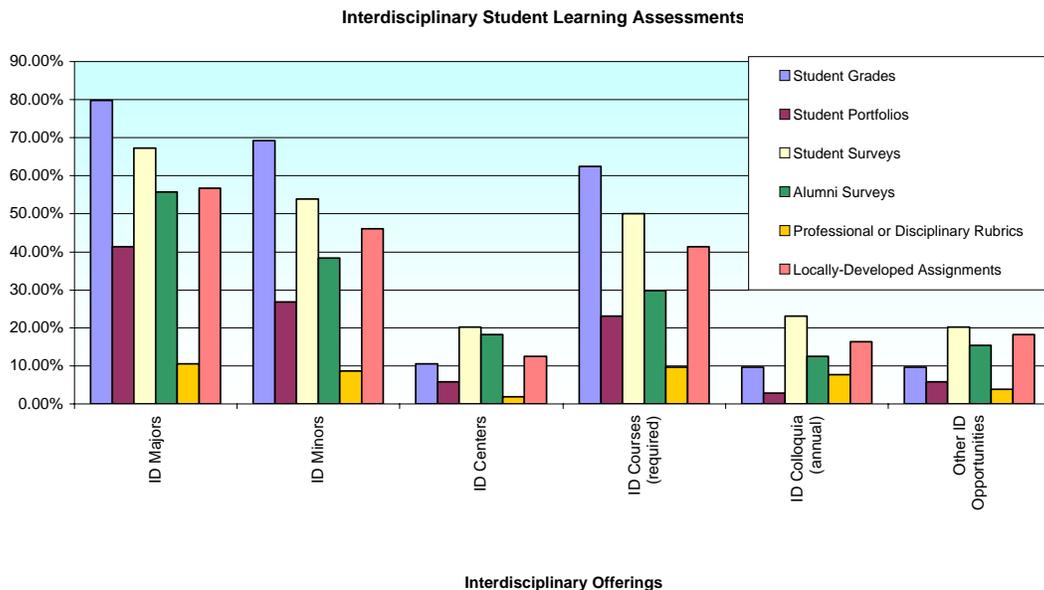
“creativity,” Ellen McCulloch-Lovell, President of Marlboro College commented: “I think beyond integration, or maybe through integration, interdisciplinarity breeds innovation. So, the question becomes whether the kids who do interdisciplinarity now are the innovators of the next generation?”

Before addressing how these more longitudinal outcomes might be tackled with future forms of assessment, it is important to review how institutions are measuring the more immediate learning outcomes identified above and with what current strategies.

“Success” with Interdisciplinary Student Learning

To examine how campuses are measuring the “success” of their interdisciplinary programs, respondents were first asked to identify which, if any, of the six pre-identified methods are used to assess student learning outcomes for each of the five different types of interdisciplinary programs offered on campus. (See Graph 4 for assessment methods by interdisciplinary activity.) Overwhelmingly, the most commonly used assessment method is *student grading*, which is used by 79.81% of the institutions to assess student learning associated with “interdisciplinary majors,” by 69.23% for “interdisciplinary minors,” and by 62.50% for “required interdisciplinary courses.” After *student grades*, 67.31% of the institutions have adopted *student surveys* to measure student learning associated with “interdisciplinary majors,” 53.85% for “interdisciplinary minors,” and 50.00% for “required interdisciplinary courses.” Lastly, 56.73% of the institutions report creating *locally-developed assignments* to assess student learning associated with “interdisciplinary majors,” 46.15% for “interdisciplinary minors,” and 41.35% for “required interdisciplinary courses.”

Graph 4



Secondly, in order to determine whether the assessment methods used on campuses are effective, respondents were also asked to rate each method in terms of its ability to capture the five primary learning outcomes discussed above that campuses associate with inter-disciplinary education. About two-thirds of the respondents feel that *student grades* are most useful when assessing “critical thinking” (64.89%), “problem solving” (64.89%), and/or “analytic skills” (63.83%). Less than half find *student surveys* useful for evaluating any of these skills, whether for disciplinary or interdisciplinary programs, and exactly half think their own *locally-developed assignments* are useful. Finally, in terms of “multidisciplinary breadth” and the “integration of diverse knowledge” – the two outcomes uniquely associated with interdisciplinary education, less than half of the respondents found any of the listed assessment methods particularly helpful, including *student grades*, *student surveys*, or *locally-developed assignments*.

Good assessment of interdisciplinary learning involves offering students ample opportunities to reflect — reflection is key in interdisciplinarity.” This gives you a sense as to whether students are beginning to get “the shape of knowledge today”. Also important is observing students’ ability to engage with society as a whole, and engaging personally with knowledge. Reflections (i.e., written, oral, informal) enable us to see whether a student is creating her view of that knowledge curve and positioning herself in it. You can only see this through student reflections.

Faculty representative,
Evergreen State College

Importantly, many national higher education and research discussions have focused on the relative strength of “authentic” assessment methods in capturing the complexity, ambiguity, and multiplicity of skills and aptitudes associated with interdisciplinarity. Yet, less than half of the schools in our sample report using, for example, portfolios or the like to assess student learning outcomes associated with any of their interdisciplinary offerings. This suggests a potentially serious disconnect between interdisciplinary education assessment methods recommended in the literature and those being implemented on campuses to date. To this point, on the one hand, 41.12% of the institutions in our sample feel that they are *very successful* at offering quality interdisciplinary education, and another 55.14% feel they are *successful* or *somewhat successful*. None of the responding institutions would say they are *not at all successful*, which suggests one of two things: (a) campuses feel they are doing well at interdisciplinary programming and do not need further assistance, or (b) our sample has been biased toward “successfully interdisciplinary” schools by virtue of self-selection. However on the other hand, these same schools feel less sanguine about their success in assessing interdisciplinary learning outcomes. Only 1.9% of the schools feel they are *very successful* at assessing interdisciplinary learning outcomes, 28.2% report being *successful*, and 60.2% believe they are *only somewhat successful*. In fact, 6.8% report being *not at all successful* in their approach to assessment. Hence, should our sample actually be more biased toward “successfully interdisciplinary” institutions, a deficit of “successful interdisciplinary assessment” amongst this group could imply (as does the literature) the likelihood of even more severe shortcomings with successful interdisciplinary assessment practices across the population of liberal arts institutions (see, for example, Field and Stowe, 2002).

NEW DIRECTIONS IN THE ASSESSMENT OF INTERDISCIPLINARY STUDENT LEARNING

When asked “What kinds of information would help your institution improve either (a) its accomplishments with or (b) its assessments of interdisciplinary education,” just over two-thirds of the respondents in our sample requested assistance with assessment, compared to approximately 20% who requested general information about interdisciplinary practices at other institutions and less than 10% who sought advice on improving interdisciplinary programs on their own campus. Within the responses pertaining to assessment, more than half were explicit in their request for assistance with developing “comprehensive,” “rigorous,” “standardized,” and “formal” indicators and models for assessing interdisciplinary outcomes.

When we examined the literature on interdisciplinary assessment at both the K-12 and college levels, we found a variety of indirect and direct approaches. Indirect methods – surveys and questionnaires, interviews, telephone survey and focus groups – ask learners to reflect on what they have experienced and achieved. By comparison, direct methods measure student learning directly via, for example, standardized tests and/or locally-developed instruments. In some cases, direct and indirect indicators are also combined through the application of student journals, self-evaluations, and portfolios. In many instances, however, these current approaches still tend to focus on single measures or reductionist strategies in order to evaluate specific skills and abilities. As a consequence, they are often not as well-suited as they might be to measuring the complexity, ambiguity, and multiplicity of skills and aptitudes involved in the creation of new meanings, explanations, or products via interdisciplinary synthesis and integration.

In this section, we draw off the research expertise of several working group members to explore new avenues for the assessment of interdisciplinary programs. Below we describe two different approaches that could be developed by adopting and adapting elements from existing assessment strategies. The value-added and performance-based approaches we describe below fall into the category of assessment frequently referred to as “authentic” assessments (see, for example, Archibald & Newman, 1988; Wiggins, 1989) because they involve the performance of tasks that are valued in their own right.

Value-Added Assessment for Interdisciplinary Programs

This section presents a discussion of performance measures that could assess the “value-added” outcomes of interdisciplinary programs. Such assessment programs might take one (or a combination) of at least five forms described below. These approaches vary in accordance with the assumptions or intent of the assessment effort.

Before proceeding it is important to define a few key terms. Value-added assessment refers to an assessment regime that measures growth that has occurred as a result of participation in the institution or academic program. In other words, what improvement has occurred because the students were exposed to the educational experience; typically, this is accomplished through a pre-test/post-test model. Performance measures are a form of direct assessment of student learning in which students demonstrate their level of skill or ability. Performance measures can be contrasted against indirect measures (for example, assessing writing ability by using a proxy indicator such as number

of credit hours of writing courses completed), as well as compared to self-reports (such as a survey in which students report on what they believe to be their level of writing ability).

Approach I: Measurement of General Skills

As noted earlier in this report, some campus representatives articulated that interdisciplinary programs are a means to develop the same kinds of skills associated with liberal arts education, including, for example, critical thinking skills, problem solving skills, and analytical skills. Here, the empirical question might be whether or not students develop such skills to higher degrees by participating in interdisciplinary programs (as compared to those who are in traditional disciplinary programs). To answer such questions, it would be possible to use currently existing assessment programs, such as the Collegiate Learning Assessment (CLA), the Measure of Academic Proficiency (MAP), or the Collegiate Assessment of Academic Proficiency (CAAP). These measures focus on assessing such general education skills. Comparing demonstrated skill levels before and after would enable such value-added analyses.

Approach II: Measurement of Other Skills

Some campus representatives noted that they believe interdisciplinary programs might lead students to be, for example, more innovative and creative, thus acquiring skills distinct from those typically expected from liberal arts education. Assessment of creativity poses an interesting challenge when done through any form of standardized testing which has a uniform scoring procedure. Typically, an authoritative scoring rule must be established as the standard against which the student responses are scored. This could take the form of a more straightforward answer key, or, as in the case of the CLA, a rubric against which open-ended essays are reviewed. Such scoring procedures seek to ensure reliability and validity of the results. By its very nature, an attempt to assess student innovativeness would not fall into this format; assessing students' ability to arrive at unexpected or original ways of approaching an issue defies the *a priori* creation of a scoring system. This is not to say that conducting an assessment of such skills is impossible, but rather there is no easy way to establish a large program to do so, and might be better left for individual faculty or groups of faculty to do in a local manner.

Approach III: Measurement of Ability to Approach an Interdisciplinary Topic

Again, as noted in the report, some issues are interdisciplinary by nature. Just as one example, to address pressing problems of urban renewal, one might benefit from perspectives of economics, sociology, demographics, geography, architecture and political science, to name but a few disciplines. To that end, an academic program in urban studies would combine those disciplines as a way to mirror the issue so students are well versed (and well practiced) in combining those perspectives.

Thinking about interdisciplinarity in this manner might lead to an assessment program that is topic bound. Here, one might create a performance task that mirrors the complexity of an urban renewal problem. Students interested in this area might then be assessed before and after as a means to see how their skills in approaching such issues change. Comparisons could be made between those who studied in such interdisciplinary programs (e.g., an urban studies program), and those who focused on only one area (e.g., a

sociology major). As an aside: one might or might not assume that such learning cuts across topic areas. To wit, would one assume that this same student who majored in urban studies would also be able to excel in a project that focused on another interdisciplinary topic area such as the AIDS crisis; would one expect the student who studied ethnomusicology to be better equipped than her disciplinary counterparts to complete the task in urban renewal? These are empirical questions to consider.

Approach IV: Assessment of Facility with Materials from Different Disciplines

As a variation on Approach I, measures could be developed that are similar in nature to the performance tasks that are a part of the CLA. The CLA performance tasks present the student with a "real-life" scenario, such as preparing to address issues for an upcoming mayoral debate, and the student is given a document library of materials (such as newspaper articles, research briefs, statistical reports, and memos) that she or he would use to prepare a response. Such measures could be developed by teams of faculty, where an ideal response would require the students to employ different disciplinary perspectives. In the design, faculty would create materials, that, in order to be optimally utilized, would require the student to think alternatively from the various disciplinary points of view. In other words, the tool would be created such that one who utilized only one disciplinary perspective would not complete the task as well as one who utilized the greater range of perspectives.

Approach V: Assessment of Ability to Work in Interdisciplinary Teams

Finally, another perspective on how to assess interdisciplinary learning depends on a different conceptualization of where such learning exists. The previous four examples have assumed that a student is the appropriate unit of analysis; in other words, assessment approaches would therefore determine the *individual* student's level of facility, skill level and understanding. An alternative approach would be to consider that interdisciplinary ability is located in the space between students, so one would look to *groups* of students (who may or may not be drawn from separate disciplines) to consider how they together addressed an issue. Here, a variation on an approach such as the charrette project described below might be most efficacious.

Performance-Based Assessment for Interdisciplinary Programs

The argument for performance-based assessment is a simple one: If we aim our educational efforts at developing a given capacity, we would do well to offer students multiple opportunities to put such capacity to use and reflect on their work. In doing so, students at once build and demonstrate their growing understanding, enabling faculty to offer direct informative feedback to nurture the target capacity further. For example, a course aimed at developing students' ability to conduct scientific experiments must give students a chance to examine and critique experimental designs and propose and test designs of their own, typically receiving feedback along the way. The understanding sought after is not limited to definitional information about experimental designs. Rather, it is embodied in students' capacity to use design knowledge flexibly and effectively to craft an experiment on their own. Assessment may focus on the degree to which students can craft informed hypotheses for their experimental designs, can identify and manipulate variables and controls, and can consider alternative interpretations of their results.

While assessing disciplinary capabilities enables faculty to rely on more or less agreed-upon criteria to discern what counts as quality work, implementing criteria to assess interdisciplinary work has proven more elusive. In part this is due to the sheer variety of purposes, contexts, and disciplinary combinations captured by the term and in the survey described above; but, in part, it is also due to the fact that interdisciplinary assessment remains an understudied phenomenon. What exactly should faculty be looking for when seeking markers of quality interdisciplinary work?

To fill this gap, Veronica Boix Mansilla has examined assessment practices in experienced collegiate interdisciplinary programs empirically. She and her colleagues at the Harvard Interdisciplinary Studies Project (HISP) have interviewed 70 faculty and students in four experienced interdisciplinary collegiate programs: Bioethics at the University of Pennsylvania, Interpretation Theory at Swarthmore College, Human Biology at Stanford University, and the NEXA Program at San Francisco State University. This HISP study has focused on the following questions: (a) What qualities do experienced faculty in well-recognized interdisciplinary undergraduate programs ascribe to accomplished student interdisciplinary work? and, (b) Can the qualities identified be integrated into a coherent and usable framework designed to assess student interdisciplinary understanding?

Analysis of interview transcripts and student work has given rise to an assessment framework that highlights four core dimensions of student interdisciplinary work: *Purpose*, *Disciplinary Grounding*, *Integration* and *Thoughtfulness* (Boix Mansilla, 2005). Below are summary descriptions of each dimension.

Purpose

Interdisciplinary work is often geared toward describing or explaining phenomena or events that are multidimensional, solving complex problems, proposing new interpretations, creating products. The purpose of a piece of work or interdisciplinary exploration drives the crafting of the work – what disciplinary insights are relevant, which disciplines should dominate, how disciplines could be combined to leverage or advance the goals of the work, how to decide when the work is “done” and its purpose accomplished.

To assess this dimension of interdisciplinary work faculty begin by asking: What is the purpose of the work? Is the purpose of the work clear (whether explicit or implicit)? Does the purpose invite/require an interdisciplinary approach? How so?

Disciplinary Grounding

Interdisciplinary work builds on insights, findings, methods, techniques, languages, and modes of thinking in two or more disciplines or areas of expertise to accomplish its goals. This dimension examines the degree to which students have taken advantage of the disciplinary learning opportunities offered in the course to advance the purpose of their work.

We may ask which disciplines inform this work? Are disciplinary insights, methods, languages and values used in rich and effective ways? Consider each discipline involved (e.g. Is this scientific concept accurate? Is that artistic representation provocative?)

Integration

Interdisciplinary work invites students not only to use multiple disciplines but to integrate them to accomplish the purpose of a piece of work. When disciplines are combined, new understandings are possible. For example, by integrating a new discipline like chemistry in a geography-based study of global climate change students come to *explain the phenomenon* (e.g. how Co₂ traps heat in the atmosphere) in ways that they would not have been able to get at through geography alone. Memorializing – creating an aesthetic visual commentary (art) about a past event (history) – enables students to synthesize the significance of the event in an evocative metaphor, one that a non-artistic approach might have missed. Multiple disciplinary combinations can invite deeper and richer understandings.

We may therefore ask: What are the key points of integration proposed in the work (i.e., where are disciplinary perspectives clearly brought together in a phrase, metaphor, interpretation, or explanation)? Are the integrations enabling students to advance their understanding effectively (e.g. to produce more comprehensive descriptions, multi-causal explanations, novel interpretations, or deeper explorations that benefit from the combination of perspectives)?

Thoughtfulness

Interdisciplinary work invites students' thoughtful engagement with their topics of study. Students weigh different aesthetic decisions to interpret a historical event, they consider competing explanations for social or natural phenomena, they strive for deeper, less obvious accounts of human experience. Thoughtfulness – the ability to consider choices, possibilities and challenges with care – characterizes the process of producing interdisciplinary work and is sometimes made explicit in its outcome.

Assessing this dimension of student work may involve considering the degree to which the student has reflected about the learning challenges and possibilities of bringing disciplinary insights together to address her purposes. Occasionally this dimension may call for additional pieces of evidence (e.g., a student reflection or a brief conversation) that makes students' thinking visible.

A productive use of the framework, Boix Mansilla point out, demands a careful adaptation of each of its dimensions to the problems of study and disciplinary repertoires in a particular course or program. What are the disciplinary understandings that the course sought to develop? What should be the value added of bringing disciplinary lenses together? How might students exhibit critical awareness in this particular project? Questions of this kind enable instructors to tailor the framework to their content areas and in turn to take it into account as they establish the aims and processes of their instruction.

Charrette – An Example of Performance-Based Assessment in Action

Diana Rhoten and Edward Hackett have recently experimented with a new interdisciplinary assessment exercise adapted from the 19th century concept of the “charrette.” Literally translated to “cart,” members of the school of architecture at the École des Beaux-Arts in Paris coined the 19th century term to mean “an intense final effort made by architectural students to complete their solutions to a given architectural problem

in an allotted time ...” (Grove, 1981). The genesis of the charrette rests in the tradition of faculty assigning design problems so difficult that only a few students could solve them in the allotted time before the cart rolled past the drafting tables to collect the students' work.

Taking a loose interpretation of the term (i.e., a short intensive study culminating in the presentation of results) and applying it to interdisciplinary education, Rhoten and Hackett have modified the charrette model to stimulate interdisciplinary group work. In addition, Rhoten and Hackett have overlaid the charrette experience with an experimental research and evaluation design that seeks to assess whether students trained in interdisciplinary programs appreciate, evaluate, and integrate diverse knowledge-bases in a manner that transcends disciplinary boundaries and that distinguishes them from their colleagues trained in more traditional disciplinary programs. This experimental design controls for the comparison of the collaborative processes and products across different graduate student working groups composed of junior versus senior students enrolled in interdisciplinary programs and junior versus senior students enrolled in disciplinary programs.

In the first iteration of the charrette-based assessment – Snowbird Charrette, August 2006 – eight graduate student working groups of six members each were tasked with an interdisciplinary environmental research problem formulated by a group of selected “experts.” Each group was given 2.5 days to design and develop a research proposal to study that problem. The research proposal was prepared as a narrative and then presented “live” to the experts. Each group’s proposal and presentation were then evaluated using a modified version of an interdisciplinary assessment rubric developed by Veronica Boix Mansilla, Liz Dawes, Carolyn Haynes & Chris Wolfe at the Harvard Interdisciplinary Studies Project.

Thanks for inviting me to the Snowbird Charrette. It was great to meet people from other disciplines, see my ideas get quashed, restrained and replaced by better ideas, and feeling great about the end result.

Student participant,
Snowbird Charrette

Based on their experience with the August 2006 charrette, Rhoten and Hackett will develop and disseminate charrette guidelines for those institutions and/or individuals interested in implementing their own charrette as either a learning or learning assessment experience.

CONCLUSION

The most fertile fields for really new fundamental developments are almost always to be found between the edges of the orthodoxologies and professorships of the colleges (subjects recognized in our standard classifications of human knowledge)....Just as the prospector finds his best hunting grounds along the fissures and contact planes between different massive formations, so in the lines of human thought and invention.

“Random Notes on the Salvaging of Ideas and Personalities”
Frank Thomas Cameron, *Cottrell, Samaritan of Science*

“Are we just experiencing some sort of Hawthorne Effect around interdisciplinarity, and thus all this attention is really about the ‘newness’ of interdisciplinarity and not about interdisciplinarity itself?,” one working group member asked at the final hour of this project. Although there is no empirical way to answer this question at this time, the consensus amongst the higher education researchers and institutional leaders around the table is that ‘interdisciplinarity, *c’est arrivé.*’ This is not to say that interdisciplinarity is or should be seen as an unequivocally stable or unambiguously good, but simply that it has become a recognized part of the intellectual commons, a permanent entry in the academic lexicon.

The arrival of interdisciplinarity may have stirred up more controversy than it has settled. This should perhaps not be surprising given that interdisciplinarity is often a “critique of ‘old knowledge’” (Bird, 2001: 466) and a “challenge to the limitations or premises of the prevailing organization of knowledge” (Salter and Hearn, 1996: 43). As another working group member mused, interdisciplinarity forces us to struggle over whether the role of higher education institutions is to “create new or conserve old knowledge. It is all about the simplicity of the disciplines we [the academic community] trust pitted against the complexity of the interdisciplines we mistrust.” To which another responded, “Which of course brings us back to the difference between liberal arts and interdisciplinarity.”

As discussed early in this paper, the intellectual motivations and educational ambitions of interdisciplinary education may not be wholly new to or distinct from those of liberal arts education. In fact, interdisciplinary programs might be best considered a ‘modern’ strategy to achieve some of the broader goals of liberal arts education. What is new and should not be overlooked, however, are the institutional conditions that define liberal arts education and interdisciplinary education today. Like all institutions of higher education, liberal arts colleges and universities operate in the face of numerous financial pressures, varied stakeholder expectations, competing research agendas, changing intellectual fads, and constant peer competition. As a result, the anticipated benefits of each institutional decision and investment must be balanced against the expected costs. If our sample is any indication, for the vast majority of liberal arts institutions, the results of the cost-benefit analysis apparently weigh in favor of pursuing interdisciplinarity versus not. Thus, it behooves the liberal arts community to develop better approaches to delivering and assessing interdisciplinary education in a manner that does not force them to pit interdisciplinarity against disciplinarity going forward, but instead allows them to offer both and promote each well for its students who demand them.

In this White Paper, we have attempted to plot the landscape of interdisciplinarity across a sample of liberal arts colleges and universities in the United States based on survey and interview data reported to the Teagle – SSRC Working Group. Although missing data prevents us from charting a perfectly precise and detailed topography, the resulting map offers a rough but representative guide of the different ensembles of education programs and assessment practices defining this field of organizations. In addition to outlining current contours of the terrain, we have sought to use this guide as a tool for identifying underdeveloped areas where the occupying communities might benefit from further investment. In this spirit, the project concludes with the preliminary framing of new assessment opportunities that could capture the unique qualities of interdisciplinary learning.

But, like the arrival interdisciplinarity itself, this paper raises at least as many questions as it resolves – many ‘Big Questions’ that deserve further inquiry. For example: How should institutions and individuals balance disciplinarity with interdisciplinarity? What is the “right” equilibrium?” 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? In addition to developing assessment approaches that can both demonstrate and distinguish interdisciplinary learning, how do institutions ensure that such assessment is in the service of local educational purposes while also addressing the larger environment of accountability? Finally, beyond student learning outcomes, what other effects of interdisciplinarity on, for example, faculty identities and roles, campus life and culture, and student personal and professional trajectories in the short and long term?

While we may leave these new questions for others to take up, we hope to pursue the work already started here in two concrete ways. First, using the survey data gathered from our sample of 109 liberal arts institutions, we will seek to analyze further the different ensembles of interdisciplinary education programs and assessment practices while comparing and controlling along the dimensions of instructional context (i.e., arts and sciences, professional); enrollment profile (i.e., exclusively, very high, or majority undergraduate); student body size; and, primary funding source (i.e., public, private). Second, drawing on the possible alternatives for performance-based and value-added assessment of interdisciplinary learning sketched above, we will explore funding opportunities for developing these new frameworks and disseminating general guidelines for those interested in deploying them locally on their campus.

REFERENCES

- AACU (1999). *Mapping Interdisciplinary Studies*. Washington, DC: Association of American Colleges and Universities.
- AACU (2002). *Greater Expectations: A New Vision for Learning as a Nation Goes to College*. Washington, DC: Association of American Colleges and Universities.
- AACU (2004). *Responsibility for the Quality of the Baccalaureate Degree*. Washington, DC: Association of American Colleges and Universities.
- AACU (2005). *Liberal Education Outcomes: A Preliminary Report on Student Achievement in College*. Washington, DC: Association of American Colleges and Universities.
- Archibald, D. and Newman, F. (1988). *Beyond Standardized Testing: Assessing Authentic Achievement in Secondary Schools*. Washington, DC: National Association of Secondary School Principals.
- Bird, E. (2001). Disciplining the Interdisciplinary: radicalism and the academic curriculum. *British Journal of Sociology of Education*, 22 (4), 463-478.
- Boix-Mansilla, V. (2005). Assessing Student work at Disciplinary Crossroads. *Change*, 37 (January/February), 14–21.
- Boix-Mansilla, V. and Gardner, H. (2003). Assessing Interdisciplinary Work at the Frontier. An Empirical Exploration of Symptoms of Quality. Retrieved February, 2006, from <http://www.interdisciplines.org/interdisciplinarity/papers/6>.
- Business-Higher Education Forum (1999). *Spanning the Chasm: A Blueprint for Action*. Washington, D.C.: American Council on Education and National Alliance of Business.
- Colwell, R. (2003). Welcoming Remarks to Integrative Graduate Education and Research Training Principal Investors' Meeting. February 3. <http://www.nsf.gov/od/lpa/forum/colwell/rc/030203igert.htm>.
- COSEPUP. (1995). *Reshaping the Graduate Education of Scientists and Engineers*. Washington, DC: National Academies Press.
- Farmer, D.W. and Napieralski, E. A. (1997). Assessing Learning in Programs. In J.G. Gaff et al. (Eds.), *Handbook of the Undergraduate Curriculum: A comprehensive guide to purposes, structures, practices, and change* (pp. 591-607). San Francisco, CA: Jossey-Bass
- Feller, I. (2004). Whither Interdisciplinary? Unpublished Manuscript. Washington, DC: American Association for the Advancement of Science.
- Field, M. and Stowe, D. (2002). Transforming Interdisciplinary Teaching and Learning Through Assessment. In Carolyn Haynes (Ed.) *Innovations in Interdisciplinary Teaching*. (pp. 256-74). Westport, CT: Oryx Press.
- Gibbons, M. et. al., (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. Sage Publications, London, UK.
- Grove, P. (1981). *Webster's Third New International Dictionary*. Springfield, MA: Merriam-Webster, Inc.
- Huber, M. T. and Hutchings, P. (unpublished). *Integrative Learning: Mapping the Terrain. A background paper on integrative learning within the context of liberal education*. http://www.carnegiefoundation.org/elibrary/docs/Mapping_Terrain.pdf.

- Kahn, R., Prager, D. (1994). Interdisciplinary Collaborations Are a Scientific and Social Imperative. *The Scientist*, 8 (14), 12.
- Klein, J.T. (1990). *Interdisciplinarity*. Detroit, MI: Wayne State University Press.
- Klein, J.T. (1996). *Crossing Boundaries: Knowledge, Disciplinarity, and Interdisciplinarity*. Charlottesville, VA.: University Press of Virginia,
- Klein, J.T. (2002). Assessing Interdisciplinary Learning K-16. In J.T. Klein (Ed.), *Interdisciplinary Education in K-12 and College: A foundation for K-16 dialogue* (pp. 179-196). New York: The College Board.
- Kockelmans, J. (1979). Why interdisciplinarity? In: Kocklemans, J. J. (Ed.), *Interdisciplinarity and Higher Education*. Pennsylvania State University Press, University Park, PA.
- Lattuca, L. (2001). *Interdisciplinary Research and Teaching among College and University Faculty*, Nashville, TN: Vanderbilt University Press.
- Lattuca et al. (2004). Does Interdisciplinarity Promote Learning? Theoretical Support and Researchable Questions. *The Review of Higher Education*, 28 (1), 23-48.
- NAS. (2004). *Facilitating Interdisciplinary Research*. Washington, DC: National Academies Press.
- Nissani, M. (1997). Ten Cheers for Interdisciplinarity: The Case for Interdisciplinary Knowledge and Research. *Social Science Journal*, 34 (2), 201-216.
- NRC. (2000). Committee on Building Bridges in Brain, Behavioral, and Clinical Sciences. (2000). *Bridging Disciplines in the Brain, Behavioral, and Clinical Sciences*. Washington, DC: National Academies Press.
- Rhoten, D. (2003). A Multi-Method Analysis of Social and Technical Conditions for Interdisciplinary Collaboration. Final Report to the National Science Foundation (BCS-0129573). The Hybrid Vigor Institute, San Francisco, CA. Retrieved May, 2006, from http://www.hybridvigor.net/interdis/pubs/hv_pub_interdis-2003.09.29.pdf.
- Rhoten, D. (2004) Interdisciplinary Research: Trend or Transition? *Social Science Research Council Items and Issues*, 5 (1), 6-11.
- Roschelle, J. (1995). What Should Collaborative Technology Be? A Perspective From Dewey and Situated Learning. CSCL. Retrieved March 2006 from http://www-cscl95.indiana.edu/cscl95/outlook/39_roschelle.html.
- Rustum, R. (2000). *The Interdisciplinary Imperative: Interactive Research and Education, Still an Elusive Goal in Academia*. A Report on the International Conference on Interdisciplinarity Revisited: Materials Research as a Case Study. Lincoln, NE: Writer's Club Press.
- Salter, L., Hearn, A. (1996). *Outside the Lines: Issues in Interdisciplinary Research*. Montreal, Canada: McGill-Queen's Press.
- The New York Times Job Market. (2002). *The New York Times Job Market Research Report*. New York, NY: Beta Research Corporation. < http://www.corporate-ir.net/ireye/ir_site.zhtml?ticker=NYT&script=461&layout=-6&item_id=327991>.
- Weingart, P, Stehr, N. (2000). *Practising Interdisciplinarity*. Toronto, CA: University of Toronto Press.
- Wiggins, G. (1989). A True Test: Toward more authentic and equitable assessment. *Phi Delta Kappan* 70 (9), 7033-713.
- Winter, D. et al. (1981). *A Case for the Liberal Arts*. San Francisco, CA: Jossey-Bass.

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Albion College
Albright College
Allegheny College
Amherst College
Antioch College
Austin College
Bard College
Barnard College
Bates College
Beloit College
Bennington College
Bucknell University
California State University Monterey Bay
Centre College
Chatham College
Claremont McKenna College
Coe College
Colgate University
College of the Atlantic
College of the Holy Cross
College of Wooster
Concordia College
Cornell College
Denison University
DePauw University
Earlham College
Erskine College
Evergreen State College
Excelsior College
Franklin & Marshall College
Green Mountain College
Grinnell College
Gustavus Adolphus College
Hamilton College
Hampshire College
Hartwick College
Harvey Mudd College
Hendrix College
Hollins University
Hope College
Houghton College
Illinois Wesleyan University
Kalamazoo College
Kenyon College
King College
Knox College
Lafayette College
Lake Forest College
Lawrence University
Lycoming College
Lyon College
Macalester College
Marlboro College
Massachusetts College of Liberal Arts
McDaniel College
Millsaps College
Monmouth College
Moravian College
Mount Holyoke College
Muhlenberg College
Nebraska Wesleyan University
Oberlin college
Occidental College
Ohio Wesleyan University
Pitzer College
Randolph-Macon Woman's College
Reed College
Rhodes College
Ripon College
Schreiner University
Scripps College
Seton Hill University
Sewanee: The University of the South
Shimer College
Siena College
Skidmore College
Smith College
Southwestern University
St. Andrews Presbyterian College
St. John's College, Maryland
St. Lawrence University
Stephens College
Swarthmore College
Sweet Briar College
Transylvania University
University of Dallas
University of Minnesota, Morris
University of Pittsburgh at Bradford
University of Pittsburgh at Greensburg
University of Puget Sound
Ursinus College
Vassar College
Warner Pacific College
Washington & Jefferson College
Washington & Lee University
Washington College
Wesleyan College
Wesleyan University
Western State College of Colorado
Westminster College
Wheaton College, Norton, Massachusetts
Wheaton College, Wheaton, Illinois
Whittier College
Willamette University
William Jewell College
Williams College
Wittenberg University

APPENDIX 3: INSTITUTIONAL SURVEY RESPONDENTS

	Population	Sample
SELECTIVITY		
Very Selective	40.27%	45.37%
Moderately Selective	45.25%	44.44%
Minimally Selective	6.33%	6.48%
Open Admissions	3.62%	1.85%
Not in Study Universe	4.52%	1.85%
ENDOWMENT (END OF FY03, IN MILLIONS)		
\$0 – 50	35.75%	25.69%
\$50–100	19.46%	22.94%
\$101 – 150	8.14%	11.01%
\$151 – 200	5.88%	9.17%
\$201 – 250	3.17%	3.67%
\$250+	14.93%	20.18%
NA	12.67%	7.34%
ENROLLMENT		
0 – 500	8.11%	3.67%
501 – 1000	19.37%	20.18%
1001 – 1500	27.03%	31.19%
1501 – 2000	22.07%	20.18%
2001 – 2500	10.81%	11.93%
2501 – 3000	5.41%	7.34%
3000+	7.21%	5.50%
FOUNDING YEAR		
1651-1700	0.93%	0.93%
1701-1750	0.93%	1.85%
1751-1800	6.02%	6.48%
1801-1850	28.70%	32.41%
1851-1900	38.89%	37.96%
1901-1950	12.04%	10.19%
1951-2000	12.50%	10.19%
GEOGRAPHIC REGION		
Far West	10.36%	11.01%
Great Lakes	14.86%	18.35%
Mideast	21.62%	27.52%
New England	12.61%	12.84%
Plains	8.11%	10.09%
Rockies	2.25%	1.83%
Southeast	27.03%	14.68%
Southwest	2.70%	3.67%
CARNEGIE CLASSIFICATION (2005 REVISION)		
A&S-F – NGC	38.29%	50.46%
A&S-F – SGC	10.36%	11.93%
A&S-F – HGC	1.35%	0.92%
A&S+Prof/NGC	22.52%	14.68%
A&S+Prof/SGC	8.56%	9.17%
Bal/ NGC	11.71%	8.26%
Bal/SGC	5.41%	4.59%
Prof-F/NGC	0.90%	0.00%
Assoc-Dom	0.45%	0.00%
Special Focus	0.45%	0.00%

