



Taylor & Francis  
Taylor & Francis Group

---

Defining and Teaching Interdisciplinary Studies

Author(s): William H. Newell and William J. Green

Reviewed work(s):

Source: *Improving College and University Teaching*, Vol. 30, No. 1 (Winter, 1982), pp. 23-30

Published by: [Taylor & Francis, Ltd.](#)

Stable URL: <http://www.jstor.org/stable/27565474>

Accessed: 15/07/2012 09:53

---

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at

<http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Taylor & Francis, Ltd. is collaborating with JSTOR to digitize, preserve and extend access to *Improving College and University Teaching*.

<http://www.jstor.org>

# Defining and Teaching Interdisciplinary Studies

WILLIAM H. NEWELL and WILLIAM J. GREEN

**R**ecent articles on the nature and prospects of liberal learning in American higher education have increasingly called attention to the crucial role of interdisciplinary studies in any ideal vision of the Academy. This insistence on the need for understanding the relationships between and among disciplines seems to arise as much from practical

The apparent movement away from interdisciplinary studies and other so-called “frills” in the early 1970s has obscured the creation of new interdisciplinary departments and even colleges in the last decade. The newly formed Association for Integrative Studies has members from over 100 colleges and universities, and a 1977 directory of inter-

---

**The origins and continued existence of disciplines are as much attributable to educational politics as to the needs of scholarly inquiry.**

---

considerations as from any traditional belief that knowledge is somehow all of a piece and deserves to be exhibited as such. Gresham Riley, for example, in his essay on the goals of a liberal education, claims that “never more than at the present time has there been a need for citizens to be able to focus the insights of various disciplines on the problems and issues which beset our collective existence.”<sup>1</sup> Underlying such calls for an interdisciplinary component to liberal education is the recognition that interdisciplinary studies encourage breadth of vision and develop the skills of integration and synthesis so frequently demanded by the problems of a culture in the midst of a profound transition.

---

*The authors are associate professors of interdisciplinary studies in the Western College Program of Miami University, Oxford, Ohio.*

disciplinary studies in the humanities lists over 2300 programs in senior institutions.<sup>2</sup> Another listing shows over 5000 faculty who teach interdisciplinary courses in environmental studies alone.<sup>3</sup>

Despite these impressive numbers, it is an unusual institution of higher education where many of the faculty do not view the interdisciplinary program on their campus with skepticism, if not hostility. They typically suspect that the program has little substance, and that what substance it does have merely duplicates the offerings of disciplinary departments. While much of this discrepancy in perspective can safely be attributed to less than noble motives, such as protection of ‘turf,’ a residue of well-placed criticism remains. There are courses claiming to be interdisciplinary which are academic froth, or merely serial presentations of disciplinary material. But the lack of legitimacy accorded sound and genuine programs may stem from causes much more basic than these.

We see four fundamental issues which must be resolved before interdisciplinary studies acquire the status which their advocates contend they deserve. The most basic of these is definitional. The term “interdisciplinary studies” itself is so loosely and so inconsistently used that almost any course which does not fit neatly within disciplinary departments is apt to be labeled “interdisciplinary.” Second, the liberal arts objectives of interdisciplinary studies are vague at best; even where practitioners can agree on what they mean by the term, it is unclear what they are trying to accomplish. Third, there are no widely accepted canons of interdisciplinary scholarship by which to judge excellence. Finally, it is not certain what the appropriate relationship is between interdisciplinary studies and the academic disciplines themselves. Should interdisciplinary studies try to overthrow the disciplines, or reform them, or stand alongside them? These are the questions we address here, with the hope that we can move the interdisciplinary studies profession toward some degree of consensus and possibly toward a wider acceptance within academia.

To illustrate the range of genuine interdisciplinary courses and to lend concreteness to our proposed definition, we draw freely upon courses offered in our own Western College Program. These examples are of more than parochial interest. “Western” is one of the new interdisciplinary programs founded in the 1970s; it is more ambitious than most, with a four-year sequence of team-taught interdisciplinary seminars in the humanities, social sciences, and natural sciences, taught by a faculty, representing eleven disciplines, which collaborates intensively on the development of new courses.

### Definition

We define interdisciplinary studies as inquiries which critically draw upon two or more disciplines and which lead to an integration of disciplinary insights.<sup>4</sup> It may seem obvious that interdisciplinary studies would involve the integration of disciplinary materials or insights, but it has been our experience that considerable misunderstanding exists on this point among purported interdisciplinarians themselves—a fact which has resulted in the overuse and misuse of the term.<sup>5</sup>

Two groups who dismiss the importance of the disciplines themselves in integrative work might be termed “adisciplinists” and “transdisciplinists.” The former hold that the disciplines are fundamentally misguided and should be abandoned. The problem with their approach, which is to begin an inquiry *de novo* without benefit of disciplinary knowledge, is that it ignores the reality that scholars do not work in an intellectual vacuum. Scholars have all been exposed to disciplines; their habits of thoughts, their choice of certain problems over others, and their methods of problem solving all owe something to this tutelage. We suspect that courses such as these lead to the charge that interdisciplinary studies are without substance.

Transdisciplinists, on the other hand, take as an article

of faith the underlying unity of all knowledge. This assumption, that everything is related to everything else, makes the division of knowledge otiose from the outset and leads to the search for a superdiscipline, based, for example, on systems theory or structuralism. The validity of the premise which informs transdisciplinary work, however, can only be determined empirically after years of interdisciplinary studies. The transdisciplinary approach is not so much wrong as premature.

Two other groups recognize the salience of disciplines for interdisciplinary study, but fail to meet the other requirements of the definition. Multidisciplinarians ignore the condition that interdisciplinary studies involve an integration of disciplinary insights. They appear to believe that any time two or more disciplines impinge upon a particular subject matter or are brought together in a single context, the result must be interdisciplinary. Multidisciplinary courses arrange in serial fashion the separate contributions of selected disciplines to a problem or issue, without any attempt at synthesis. While these courses appear to be given the label “interdisciplinary” more out of ignorance than ideological conviction, this confusion tends to reinforce the criticism that interdisciplinary studies offer little more than a conjunctive arrangement of the disciplines.

Cross-disciplinary inquiries, such as the physics of music, might well be conducted in an interdisciplinary way, but in practice they seldom are. The problem here is that one of the disciplines involved usually exercises complete hegemony (a kind of disciplinary imperialism) over the other in such fashion that the second discipline (or, more properly, its *subject matter*) becomes a passive object of study rather than an active system of thought, so that the analysis draws critically on only one discipline. Courses on the physics of music apply the principles of physics to (the subject matter of) music, but the discipline of music—its aesthetic standards and so on—is rarely considered.

Much of the confusion over the definition of interdisciplinary studies can be traced to the ill-defined nature of the disciplines themselves. Disciplines have been variously characterized by their subject matter (e.g., the past), their method (e.g., participant-observer), their perspective (e.g., the economic man), or the questions they ask (e.g., philosophic). Some scholars despair of ever conceptually distinguishing their discipline from others, resorting to assertions of the type “Physics is what physicists do.” Such assertions, however, do contain an important insight, namely that disciplines are not natural species amenable to systematic characterization through a taxonomy, but rather social organizations whose origins and continued existence are as much attributable to educational politics as to the needs of scholarly inquiry. A discipline is perhaps best characterized as a socio-political organization which concentrates on a historically linked set of problems. Toulmin has suggested that it is this peculiar “genealogy of problems” (e.g., the characteristic concerns of atomic physicists from Rutherford to Heisenberg) which gives a discip-

line its identity and which delineates it from others.<sup>6</sup> Disciplines are also distinguished from one another by the questions they ask about the world, by their perspective or world view, by the set of assumptions they employ, and by the methods which they use to build up a body of knowledge (facts, concepts, theories) around a certain subject matter.

What serves to demarcate two disciplines will vary depending on which pair is at issue. For example, physics and chemistry share something approximating a hypothetico-deductive method; they assume that the world is governed by deterministic or probabilistic laws which are in principle knowable, and they frequently ask questions about the same theoretical or empirical entity (e.g., the electron or liquid benzene). Yet the questions they ask about these entities are usually quite different. Both physics and chemistry texts deal with heat, for example, but once the formalism of thermodynamics has been developed, chemistry becomes concerned almost exclusively with the effects of heat and temperature in molecular processes and transformations, while physics tends to consider a broader range of phenomena, generally at the macroscopic level (e.g., heat transfer). To take another case, economics and sociology sometimes look at the same subject matter (urban problems), raise the same questions (“What are the causes of unemployment?”), and even use the same quantitative methodology, but unlike physics and chemistry, their perspectives may contrast sharply. (“Economics is all about how people make choices. Sociology is all about why they don’t have choices to make.”<sup>7</sup>)

To complicate matters further, some disciplines are so fragmented into competing methods and schools of thought that what gives them a loose coherence at best is some minimal agreement on subject matter. For example, the discipline of English is split into phenomenology, structuralism, and other competing schools whose only common denominator is the study of literature written in the English language.<sup>8</sup>

Because the disciplines themselves are so inherently complex, it is necessary to try to be somewhat more precise in defining the nature of an interdisciplinary study. What we envision is a process that starts with a question of such scope that it lies outside the purview of a single area of knowledge (e.g., “What form should U.S. energy policy take in the 1980s?”). To such a question it is necessary to bring a variety of narrowly disciplinary insights, each of which grows out of a more specific question, appropriate to, and approachable by a single discipline. It is the set of answers to these latter questions—questions that can be addressed by disciplines using disciplinary methods—which is then reconciled and integrated. To take an example, chemistry, geology, and economics all provide answers to questions which are of fundamental significance in setting U.S. energy policy. (What is the sulfur content of Eastern and Western coals? What is the projected rate of U.S. petro-

leum recovery? What effect will dwindling Mid-East reserves have on gasoline prices?) Yet none of these disciplines alone can adequately address the larger issue.

Questions such as “What are the causes of unemployment?” may be assumed by members of a discipline to be adequately addressed by its concepts, theories, and methods, while reasonable persons outside that discipline may believe that the insights of another discipline can contribute to the answer. The test of whether a question is disciplinary or interdisciplinary ultimately resides in the contribution of each approach to answering the question. If an interdisciplinary study of unemployment, drawing on other social science disciplines as well as economics, contributes substantially more to answering the question than economics can alone, then the question is interdisciplinary. Our belief is that many, if not most, questions phrased in everyday language are properly interdisciplinary, while questions phrased in the technical language of a discipline are typically limited to treatment by a single discipline.

To complete our definition of interdisciplinary studies, it is worthwhile to look more closely at what is meant by integrating disciplinary insights. First, it is important to recognize that these insights may well prove independent in a given study; that is, one discipline may have little or nothing to offer another. If the disciplinary insights are in fact interdependent and mutually enriching, they may be integrated by reconciling them if they are inconsistent, or combining them into a larger whole if they are consistent. Either way, this process of synthesis requires an appreciation of the full complexity of the disciplines involved, especially an awareness of their often unconscious assumptions, in order to discern the underlying common ground or conflict between their insights. It is in these acts of conciliation and integration of disciplinary insights that the art of interdisciplinary inquiry is fully realized.

### Curricular Examples

We turn now to a description of courses taught in the Western College Program at Miami University which we believe exemplify the notion of interdisciplinary studies developed above.

#### *“Energy: A Natural Sciences Approach”*

Our decreasing oil reserves and an increasing energy demand provide an opportunity for presenting theory from the natural sciences in a visible and controversial context—the energy crisis. This sophomore course was designed by a chemist and physicist to explore energy alternatives and to allow students to design an energy policy for the United States consistent with scientific principles. The approach was to examine in sequence the major energy sources—fossil fuels, nuclear power, and alternatives such as solar—from several disciplinary perspectives and then to combine the varied insights into a summary of the appropriate role of each energy source in U.S. energy policy.

The unit on fossil fuels illustrates the teaching strategy. Students were introduced to the geology of coal and oil formation, with emphasis on past environments suitable for the genesis of these biogenic deposits. This was followed by a moderately detailed study of the organic geochemistry of coal and oil. Once it was clear how energy could be stored in the bonds of organic structures and how it could

ern society. Interrelations among the industrial revolution, urbanization, demographic changes, and the modern political situation were examined for England, Europe, and the United States. The course ended with a case study of the post-World War II impact of these changes on a third world nation. The analysis used the concepts, theories, and perspectives of a number of disciplines, including eco-

---

---

## As more disciplines were brought to bear and new sets of questions were answered, the nature of the energy problem shifted.

---

---

be released on combustion, the laws of thermodynamics were introduced, by means of the Carnot engine, to point out the limitations which nature places on efficient energy use. The unit then moved to a consideration of such undesirable byproducts of fossil fuels as SO<sub>2</sub> production, acid rain, and CO<sub>2</sub> buildup in the atmosphere.

The emphasis throughout the unit was first on the derivation of disciplinary contributions from basic scientific principles, and then on the modifications of these contributions so that they could be integrated into a picture of the total energy system for coal and oil. At the end of the unit, each student was asked to evaluate this energy system in a policy statement about the appropriate future role of fossil fuels as energy sources. This same procedure was repeated for nuclear fuels and for the emerging alternatives. In the final two weeks, discussion centered on an appropriate balance of technologies to meet U.S. energy needs. During this period students had to make choices among resource abundance, technological feasibility, and environmental impact.

The course was interdisciplinary rather than multidisciplinary because of its emphasis on the modification of disciplinary contributions. For example, physicists *qua* physicists are led by their disciplinary perspective to evaluate a coal-fired power plant in terms of its thermodynamic efficiency. When the power plant is also seen from the ecological perspective of a biologist, thermodynamic efficiency must be viewed as only one element in a matrix of concerns which includes the loss of fish life from thermal pollution. As more disciplines were brought to bear and new sets of questions were answered, the nature of the energy problem shifted.

### *“Modernization”*

This sophomore course examined the structural changes accompanying the transition from a traditional to a mod-

nomics, sociology, and political science.

Unlike the physical science course on energy, where the disciplines share assumptions about the world and differ primarily in their choice of problems or their level of analysis, “Modernization” attempted to integrate the insights of disciplines which are often characterized by contrasting and competing perspectives and assumptions. It soon became apparent to the faculty that one could not take at face value the conclusions from economic analysis, that changes in industrial organization were due largely to the response of individuals to shifting economic incentives. Nor could one take unquestioningly the claim of sociology that social change was more or less imposed upon individuals by forces outside their control. Rather, in this case, as in other interdisciplinary social science inquiries, an explicit rendering and critique of disciplinary assumptions is needed before integration. It is this additional step which seems to distinguish the method of interdisciplinary social science from that of interdisciplinary natural science.

### *“The Individual in Society”*

The need to focus on the assumptions of each of the social science disciplines is also apparent in a required freshman course on the rationality and autonomy of the individual. This course looks at the theory of consumer behavior from economics, where individuals are portrayed as both rational and autonomous; at social control theory from sociology and at operant conditioning from behavioral psychology, where the individual is so nonautonomous that the question of rationality is moot; at Freudian psychology and cognitive dissonance theory from social psychology, which portray people as irrational; and at the existential psychology of Rollo May and the humanistic sociology of Peter Berger, where the argument is advanced that people are both determined and free, rational and irrational. The central question of the course, “Is the indivi-

dual free?" is then answered by reconciling these conflicting claims, once the working assumptions of each school of thought have been identified.

*"Southern Consciousness: Junior Methodology Seminar in Arts, Humanities, and Culture"*

At one level, this course is an interdisciplinary search

who claim that there can be no clear-cut interdisciplinary methodology.<sup>9</sup> But here, interdisciplinarians are not that different from disciplinarians. Both have their concrete methods, e.g., regression analysis, but both require creativity and craft in applying their overall methodology.

Still, there are guidelines for integration which can be spelled out. The good interdisciplinarian must be well

---

---

**It is important to find the right question and to state it  
so that the disciplines can complement, not talk past, one another.**

---

---

for the special character of the American South in works of music, sociological analysis, historical narrative, literature (historical novel and biography), film, popular culture, and psycho-history. More fundamentally, however, it is a comparative examination of specific interdisciplinary approaches in the humanities. Each work asks a different set of questions (implicit or explicit), represents a different method of interpretation, and presents a different perspective on southern regional consciousness. For each work, students are asked to identify the questions it asks, its method and underlying assumptions, its interpretative processes, its creative and analytical techniques, and finally its relationship to other works. At the end of the semester, students are required to evaluate how their understanding of the definition of the problem, their insight, and their grasp of scholarly and artistic technique have changed.

As an interdisciplinary course in the humanities, this differs from the social science offerings described above in several respects: first, the underlying assumptions are not so much conflicting, as compatible but different; second, the assumptions are less closely tied to particular disciplines; and finally the differing perspectives affect interpretation or expression more than they do the underlying view of reality.

As a course exploring interdisciplinary interpretations of culture, "Southern Consciousness" emphasizes to students that interdisciplinary studies *are* a methodology. In this sense, any course which is self-consciously interdisciplinary becomes a course in interdisciplinary methodology. While we have tried to set out this methodology in the definitional section of this paper, we cannot specify how the process of integration must be carried out in particular cases. Indeed, integration involves an element of creativity which often makes it more of an art, or at least a craft, than a science. Yet only to this extent can we agree with authors

versed in how each discipline looks at the world, what questions it has asked or would ask in a given situation, and, at least in the social sciences and humanities, what assumptions underlie its world view. The interdisciplinarian must be aware that insights arising from different disciplines do not always carry the same meaning; for example, concepts such as "culture" or "efficiency" are often found to have different meanings. "Southern Consciousness" emphasizes that an important element may be finding the right question and couching it in such terms that the disciplines can complement, not talk past, one another.

*"Energy: A Combined Physical and Social Science Approach"*

Despite the advantage of the interdisciplinary approach over more narrowly disciplinary ones, it was obvious that the first course on energy needed a social science component if it were truly to do justice to the issue of energy policy. Reorganization and restaffing ensued so that currently a physical chemist and a social scientist trained in economics offer a revised version which includes a major section on economic theory. The issue of extensive development of coal reserves is now explicitly linked to the economics and politics of foreign oil, and alternative energy sources are evaluated not only for their engineering efficiency and for their effects on environmental quality, but also for their economic efficiency, and political and social acceptability.

This course differs from the earlier version not only in its breadth and complexity, but also in the reevaluations necessary of the disciplinary contributions. The physical and biological sciences are largely concerned with the material inputs and outputs of each energy system, so concepts like efficiency merely need extending to a more comprehensive domain. When the social sciences are introduced, the

system is also integrated with various social systems which operate by quite different rules. With economics, efficiency can no longer be measured only in units of energy input; but also with the input of capital and labor, and dollars become the appropriate unit of measurement. When political science enters the picture, the choice of an energy policy is no longer seen as the rational weighing of costs and benefits

discipline would approach another problem. In our four-semester lower division sequence of required courses in interdisciplinary social science, students learn the functional equivalent of a semester of introductory sociology, almost all of microeconomic principles, roughly one semester of political science, a quarter of the introductory psychology course, and a similar proportion of introductory

---

## It is vital for faculty to be willing to engage other disciplines and to adopt temporarily their assumptions and world views.

---

to society. Not only efficiency, but powerful interest groups, elections, bureaucratic organization, and even past energy policy become significant factors. It appears that these differences in disciplinary perspective require a more complex process of integration than the interdisciplinary approach of the earlier course.

Another effect of moving from an interdisciplinary course within the natural sciences to one between the natural and the social sciences is that students (and faculty) find it necessary to reexamine parts of their world-taken-for-granted. Natural scientists, for example, readily see the feedback mechanisms in the natural world, but they tend to treat human behavior (which is exogenous to their system) as given and unchanging. One of the insights afforded by the social sciences is the fact that human institutions have feedback mechanisms as well. One cannot project future energy demand at the same exponential rate of growth when energy becomes more scarce; the price mechanism signals growing scarcity, and people do (and have) cut back on energy consumption in response to increasing prices.

### Interdisciplinary Pedagogy

The foregoing examples of courses at Western provide some insights into interdisciplinary curriculum development. First, unless a faculty member has a broad background in the disciplines engaged, team development of courses is essential. Even after faculty have developed the skills to teach an interdisciplinary course on their own, team curriculum development remains valuable because it helps sharpen and renew command of familiar disciplinary perspectives.

We have found that it is important that students be exposed to the basic concepts, methodologies, and theories of relevant disciplines, not just to their findings. Only by confronting the discipline itself, by looking at the world through its eyes, can the student appreciate how that dis-

cipline as well as a smattering of geography. Students completing this interdisciplinary sequence are able to enroll directly in most upper division disciplinary courses in the social sciences, including intermediate theory courses, and the grades they earn in those courses are comparable to those of students who have taken the introductory course in the discipline.

The success of these lower division courses demonstrates that interdisciplinary studies need not be limited to upper division students who have extensive exposure to a discipline. In fact, upperclassmen with exclusively disciplinary training tend to find interdisciplinary studies harder than do entering freshmen. At another institution, a philosophy professor teaching an upper division course for majors in science or in art found that

. . . they had already acquired the jargon of their instructors and committed themselves to an ideal of thought whose value seemed to them proportionate to its exclusivity . . . They made an existential leap and stayed where they landed.<sup>10</sup>

Faculty, as well as students, can learn the interdisciplinary approach without a Ph.D. in the field. All our faculty in the social and natural sciences were trained in disciplines, and only two had interdisciplinary teaching experience before coming to Western. All of our humanities faculty, on the other hand, hold interdisciplinary Ph.D.'s. While the science faculty have been most cautious about moving outside their areas of expertise, they have also developed some of the most innovative and successful interdisciplinary courses offered in the College. The critical factor in successful interdisciplinary teaching seems to be the willingness to engage other disciplines and to adopt temporarily their assumptions and world views. In spite of the jealousy with which disciplines guard their material, it turns out to be relatively simple for a liberally educated Ph.D. to learn enough about another discipline to teach at the freshman level, es-

pecially when the preparation is carried out under the tutelage of a colleague in that discipline, and as long as the tutee remains flexible. The interdisciplinary method itself is easily learned through alertness to differences between disciplines and through close examination of disciplinary assumptions, but foremost, it is learned through team teaching with colleagues experienced in interdisciplinary studies.

are several habits of mind instilled by interdisciplinary studies. The students in the Western Program tend to look at arguments more critically; they are less willing to take them at face value. They are more likely to search for bias (because they know how perspective or world view can influence an argument), and for ideology (because they are sensitive to the schools of thought within and across dis-

---

---

## Somewhat surprising, perhaps, is the ease with which the so-called “hard sciences” may be treated within interdisciplinary courses.

---

---

### Educational Outcomes of Interdisciplinary Courses

Kavaloski identifies three standard objectives of interdisciplinary education: “integration of knowledge”—the awareness of the interconnectedness of the world, the ability to see the larger context; “freedom of inquiry”—the opportunity to follow an issue without regard to artificial disciplinary barriers; and “innovation”—the chance for unconventional thinking and original insights.<sup>11</sup> While these are all credible expectations for interdisciplinary courses, our approach suggests a number of other desirable outcomes as well.

Interdisciplinary studies should foster several intellectual skills. Deductive reasoning is required to identify the disciplinary assumptions underlying a theory, and reasoning by analogy is required to see the application of an idea from one discipline to the problem of another. More important, however, is the synthetic thinking demanded by the integrative process. Synthesis is one of the higher order skills in Bloom’s taxonomy,<sup>12</sup> and we know that it is one of the few educational products which students retain after leaving college.<sup>13</sup> Best of all, synthesis enhances creativity; certainly there is a creative component to synthesis.

The importance of these intellectual skills is becoming increasingly recognized by educators. Dartmouth’s John G. Kemeny, for example, recently commented on the society’s need for individuals who are capable of integrating the knowledge of many disciplines in a single mind.<sup>14</sup> Kemeny’s sense of the importance of this integrative facility corresponds with our belief that many of the urgent problems which we face today are solvable only if we have individuals who are practiced in interdisciplinary inquiry. We agree with Kemeny when he suggests that the sine qua non of a liberal education in our day is the ability to transcend disciplinary training and to think connectively.

More closely developed, and probably more long lasting,

ciplines). They are more receptive to new ideas because they are accustomed to seeking out new perspectives and learning from them. Insofar as their studies have connected the humanities with the social or natural sciences, they are alert for the ethical dimension of research in the social and natural sciences, and attuned to value-judgments generally.

Most enduring and hardest to influence are personality traits, one of which we see associated with interdisciplinarians. Because students see the developmental and provisional nature of knowledge through their interdisciplinary work, and because they come to accept and become comfortable with the incompleteness of the integration process, they develop more tolerance for ambiguity, as measured on the Omnibus Personality Inventory.

### The Role of Interdisciplinary Studies in the University

The skills, traits, and personality characteristics set out above suggest that interdisciplinary studies have a rightful place in academia, certainly in liberal arts institutions that pride themselves on just such educational outcomes. We are now left with specifying more precisely the appropriate relationship between the disciplines and interdisciplinary studies.

Our experience during the past six years at Western has shown that there are few limitations on the kinds of disciplinary materials that can be successfully introduced in an interdisciplinary course, provided the central question of the course is properly chosen. This means it is possible for students to meet core liberal learning requirements by taking a series of interdisciplinary offerings which introduce them to selected disciplines in the natural and social sciences and humanities as well as illustrating points of connection among them. Somewhat surprising, perhaps, is the ease with which the so-called “hard sciences” may be



treated within interdisciplinary courses. In addition to the energy policy course described above, the Western faculty have offered seminars in American Environmental History, the World Food Problem, Cubism and Relativity, Darwinian Influences on Nineteenth- and Twentieth-Century Thought, and Creativity and Imagination in the Physical Sciences—all of which have required students to master technical subject matter in chemistry, physics, biology, and geology. For nonmajors, these courses provide a context for appreciating the relationship between science and their own area of interest. One of the distinct advantages of including interdisciplinary studies alongside the disciplines is that they help bridge the gap between C. P. Snow's two cultures.

Perhaps the ideal organization for undergraduate institutions would be a series of interdisciplinary courses which introduce students to the disciplines of the liberal arts by exhibiting their interdependence and interpenetrations. Disciplines would then take on the major task of training students in their respective specializations. Alongside the disciplines, at the upper division level, would be interdisciplinary courses in applied topics which overflow disciplinary bounds. An interdisciplinary social science course on the city, for example, might replace present courses in urban economics, urban politics, urban sociology, and urban geography. In a university structure where disciplines are entrenched in departments, interdisciplinarians might be well served by their own departments, and we believe they would serve the other departments of the university in turn.

### NOTES

- Gresham Riley, "Goals of a Liberal Education: Making the Actual and the Ideal Meet," *Liberal Education* 4 (1979): 436-44.
- Elizabeth Bayerl, *Interdisciplinary Studies in the Humanities: A Directory* (Metuchen, N.J.: Scarecrow Press, 1977).
- The Educational Directory*, 1 Park Ave., Suite No. 2, New York, N.Y. 10016.
- For other notable attempts at defining interdisciplinary studies, see L. Richard Meeth, "Interdisciplinary Studies: A Matter of Definition," *Change Report on Teaching*, (August 1978): 10; William V. Mayville, "Interdisciplinary: The Mutable Paradigm" (Washington, D.C.: ERIC, 1978); Centre for Educational Research and Innovation, *Interdisciplinarity: Problems of Teaching and Research in Universities* (Paris: OECD, 1972); and Joseph J. Kockelmans (ed.), *Interdisciplinarity and Higher Education* (University Park, PA: Pennsylvania State University Press, 1979).
- Michael W. Messmer, "The Vogue of the Interdisciplinary," *Centennial Review* 4 (1978): 467-78.
- Stephen Toulmin, *Human Understanding. Vol. 1. The Collective Use and Evolution of Concepts* (Princeton: Princeton University Press, 1972): 148.
- James Duesenberry, "Comment," in Universities-National Bureau of Economic Research, *Demography and Economic Change in Developed Countries* (Princeton: Princeton University Press, 1960): 233.
- William Randel, "English as a Discipline," in Robert Merideth (ed.), *American Studies: Essays on Theory and Method* (Columbus, Ohio: Charles E. Merrill, 1968).

- Jonathan Broida, "Interdisciplinarity: Reflections on Methodology," in Kockelmans, *Interdisciplinarity*.
- Charles B. Fethe, "A Philosophical Model for Interdisciplinary Programs," *Liberal Education* 4 (1973): 490-97.
- Vincent Kavaloski, "Interdisciplinary Education and Humanistic Aspiration: A Critical Reflection," in Kockelmans, *Interdisciplinarity*.
- B. S. Bloom, ed., *Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain* (New York: Longmans, Green, 1956).
- Robert F. Biehler, "Teaching for Transfer," *Psychology Applied to Teaching* (Boston: Houghton Mifflin, 1978).
- John G. Kemeny, "What is an Educated Person?" *The New York Times*, 18 May 1980, Education Section.

U.S. POSTAL SERVICE STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Required by 39 U.S.C. 3685)			
1. TITLE OF PUBLICATION IMPROVING COLLEGE AND UNIVERSITY TEACHING ISSN #0019-3089		A. PUBLICATION NO. 9/30/81	
3. FREQUENCY OF ISSUE Quarterly		B. ANNUAL SUBSCRIPTION PRICE Institutions \$20.00 Individuals \$12.00	
4. COMPLETE MAILING ADDRESS OF KNOWN OFFICE OF PUBLICATION (Street, City, County, State and ZIP Code) (Not printers)			
4000 Albemarle Street N.W., Washington, D.C. 20016			
5. COMPLETE MAILING ADDRESS OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS (Not printers)			
Same as above			
6. FULL NAMES AND COMPLETE MAILING ADDRESS OF PUBLISHER, EDITOR, AND MANAGING EDITOR (This item MUST NOT be blank)			
PUBLISHER (Name and Complete Mailing Address): Cornelius W. Vahle, Jr.; Helen Dwight Reid Educational Foundation; 4000 Albemarle St., N.W., Washington, D.C. 20016			
EDITOR (Name and Complete Mailing Address): Board of Executive Editors; 4000 Albemarle St., N.W., Washington, D.C. 20016			
MANAGING EDITOR (Name and Complete Mailing Address): Cherie Bottum; 4000 Albemarle St., N.W., Washington, D.C. 20016			
7. OWNER (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Item must be completed)			
FULL NAME		COMPLETE MAILING ADDRESS	
Helen Dwight Reid Educational Foundation		4000 Albemarle St., N.W. Washington, D.C. 20016	
8. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS (Give name, address, and percentage of total amount of bonds, mortgages or other securities.) (If there are none, so state)			
NONE			
FULL NAME		COMPLETE MAILING ADDRESS	
9. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATE (Section 4023, Code only) The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes. (Check one)			
<input checked="" type="checkbox"/> HAS NOT CHANGED DURING PRECEDING 12 MONTHS <input type="checkbox"/> HAS CHANGED DURING PRECEDING 12 MONTHS (If changed, publisher must submit explanation of change with this statement.)			
10. EXTENT AND NATURE OF CIRCULATION		AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NO. COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
A. TOTAL NO. COPIES (Net Press Run)		2375	2300
B. PAID CIRCULATION 1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES		---	---
2. MAIL SUBSCRIPTION		1960	2004
C. TOTAL PAID CIRCULATION (Sum of B. 1 and B. 2)		1960	2004
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS, SAMPLES, COMPLIMENTARY AND OTHER FREE COPIES		92	92
E. TOTAL DISTRIBUTION (Sum of C and D)		2052	2096
F. COPIES NOT DISTRIBUTED 1. OFFICE USE, LEFT OVER, UNACCOUNTED, SPOILED AFTER PRINTING		323	204
2. RETURN FROM NEWS AGENTS		---	---
G. TOTAL (Sum of E, F 1 and 2. Should equal net press run shown in A.)		2375	2300
11. I certify that the statements made by me above are correct and complete		SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER OR OWNER <i>Stephen Toulmin, President</i>	