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Interdisciplinary Perspectives earnestly solicits contributions dealing with the theory and practice of general and liberal studies. A publication fee of $35.00 (waived for members of the Association for General and Liberal Studies) must be charged if contributions are accepted by the Editorial Board. Articles should be limited to 15 double-spaced typed pages. Rebuttals and other comments on published articles should be limited to five double-spaced pages. Documentation must be included in the text. (No footnotes). Send one copy held by paper clip, with a self-addressed stamped envelope, to the Editor, Interdisciplinary Perspectives, College of Basic Studies, Boston University, 871 Commonwealth Avenue, Boston, Massachusetts 02215.
The Editor's Page

I'm sure you're as tired of reading "send manuscripts" as I am of writing the phrase. Relax. This issue will appear (I hope) relatively soon after Vol. 9, Number 2, because you have responded to earlier pleas. Therefore, I don't believe I should continue to beg — at least, not just now. First, an announcement:

The Board of A.G.L.S. has directed that, from now on, there will be a $35.00 publication fee for articles published in Interdisciplinary Perspectives. This fee will be waived for members. Since our costs are rising so rapidly we do not believe that the privilege of publishing in the only national journal devoted to general education should be open to everyone without restriction.

On a related point, I have just seen a survey which reports that Mss. acceptances by a number of journals average about 6% of those submitted. My best guess is that our acceptances work out to between 30% and 40% of submissions. Of course, we are smaller in all ways than the journals studied, but I am not unhappy with our percentage.

In connection with acceptances and rejections, it occurred to me that you might be interested in learning about the editorial process at Interdisciplinary Perspectives. When a Ms. arrives in Boston, I glance at it to ensure that it seems potentially suitable in topic, length, and format (see special instructions on "Contents" page). Then my assistant duplicates the Ms. and forwards the duplicates to members of our hardworking, sensitive, VOLUNTEER Editorial Board. (I have tried to reduce their mailing costs by providing a short form on which they can indicate a recommendation — accept/revise/reject — but these people are so interested, and so diligent, that they frequently send back both form and Ms. with a detailed note to me, and suggestions to the author for revisions.) If I agree with the Board member's recommendation, the Ms. is either filed for use as soon as possible, returned for possible revision, or returned with my regrets.

Some of you who have sent material in become concerned at the length of time between submission and response. I am now trying to send a card or note acknowledging receipt of Mss. However, compositor's and printer's charges are so high that I prefer to use our limited resources for those items, instead of for support of the Postal "service." If you don't hear from me in four or five months, probably an inquiry is justified. I'm sorry the process takes so long; I'm grateful to prospective authors for their patience; I'm thankful that the Editorial Board is so effective. They must achieve their rewards from exercising their skills, since I certainly don't reward them in any way.

G.F.E.
Linwood Orange established the value of Liberal Arts study as the basis for entry into a variety of career areas: legal, medical, governmental, and commercial. Orange surveyed 400 businesses and industries to determine the kinds of positions liberal arts majors and, specifically, English majors held in those corporations. In addition, his questionnaire provided information on courses that would benefit liberal arts students should they hope to pursue careers in the commerce or governmental area. Fundamental to all employment indicated by this survey were ten (10) basic skills or competencies that seemed to be inherent in liberal arts study and of great benefit to careers in the area of commerce.

While Orange's pioneering effort established the value of liberal arts study, it has not stemmed the tide of students turning away from pursuing the liberal arts. Furthermore, while the study establishes skills and competencies inherent in a liberal arts program, it does not identify how or in what areas these skills are developed, nor does it identify career areas to which these skills relate. Students or counselors, as a consequence, cannot establish a plan of study that would ensure the development of such skills or prepare for selected occupations. Indeed, none of these problems were addressed by the Orange study, and beyond the field of English and the readers of the Modern Language Association, the Orange study has, unfortunately, had little impact.

What Linwood Orange did, however, was demonstrate, beyond doubt, that there is practical value in terms of career employment in liberal arts study. The questions that must be addressed beyond this fact are the following:
1. If liberal arts teaches skills and competencies, how can we identify what skills and competencies are taught and where such skills and competencies are taught?

2. How can we establish a program of study for students that will allow them to take advantage of the skill training provided through liberal arts study?

3. If we can identify the skills taught by liberal arts study, can we go further and draw a relationship between those skills and career areas?

4. For those of us interested in specific majors, can we identify skills taught by that discipline and their relationship to specific career areas?

Our own experience with students pursuing general studies, one from a career counselor’s perspective, the other from the accountability required of a division chairperson, brought us to the realization that identification of career-related skills developed through liberal arts study was essential and possible. We developed last Spring a list of career related skills which we believe were taught and/or required in the pursuit of liberal arts study. That inventory of skills resulted in a survey which was sent to two-year colleges in all fifty (50) states. Since that initial mailing, another forty (40) institutions have joined our national survey and preliminary results are now available. Our survey instrument, “Career Related Skills Developed Through Liberal Arts Study,” asked that each institution identify two (2) faculty from each of the general education areas: Math/Science, Social Science, and Humanities. Each teacher was asked to fill out surveys based on the courses that they taught. The purpose was to identify skills which they specifically taught and/or skills which they required demonstration of in order to receive a passing grade. The level of skill development was also indicated on the survey instrument.

When all returns are in, it will be possible to program the information onto computer cards and to cull profiles on skills from this material on each of the disciplines within a general education area as well as profiles within general education areas themselves. Thus it would be possible for a profile to be developed on career related skills taught, for example, in English courses. There are many advantages to this approach.

1. The existence of career related skills taught in liberal arts study is established by those who teach the subjects.

2. The existence of these skills is noted for students prior to beginning a program of study.

3. Counselors and academic advisors would be able to lay out course sequences based upon skill study that would lead to career areas.

4. The existence of known skills beyond the general ten (10) established by Linwood Orange provides a means for identifying career areas using the Dictionary of Occupational Titles as a bridge between Liberal Arts’ skills and the world of work.

5. Faculty can develop courses and programs of study utilizing skill development and career related areas and thus respond, in some measure, to the charges of unaccountability, uselessness, and irrelevance.

6. Some areas of liberal arts study, specifically, languages and English, will be able to reassert their significance as very practical pursuits, both in terms of intellectual value and applicability to future career employment.

7. Administrators can offer proof of the accountability and usefulness of a liberal arts education.
While all of the returns are not in and the computerized programming has not yet begun, hand tabulation has recorded significant information which, if corroborated with final returns is of immense value to those of us interested in liberal arts study. It should also be mentioned here that while the preliminary returns indicate definite career areas that are viable through liberal arts study, a complete and thorough relationship between our inventory returns and the Dictionary of Occupational Titles is not yet available. The following statistics are based upon hand counts of the returns we have at this point in time.

For those of us particularly interested in the Humanities, respondents in Humanities disciplines checked, on the average, 33 career-related skills out of the 60 listed as being taught or required in their courses. The total number of skills checked by Humanists exceed 700.

The skill inventory is subdivided into five (5) broad career skills areas: administrating, researching, communicating, coordinating, and examining. Some 69% of the Humanities faculty responding teach administrative skills while only a handful (4.6%) teach coordinating and (13.6%) examining skills. By contrast, the greatest number teach or require demonstration of research and communicating skills, 83.3% and 85.7% respectively.

It's particularly interesting to note, and perhaps not surprising, that the Humanities disciplines exceed both Science/Math and Social Science in teaching or requiring demonstration of communicating skills, 85.7% versus Math/Science with 42.9% and Social Science with 71.4%. Math/Science, however, exceeded the other two areas in teaching research skills, 91.7% versus 83.3% and 84.6% for Humanities and Social Science respectively. Administrative skills are taught more extensively in the Social Sciences, 84.6% against only 69.2% for Humanities and 53.9% for Science/Math.

A quick run through the career related skills identified by the Humanities faculty reveals the following: all teach or require “decision making”; 86.4% teach “organizing skills”; 81.8% teach “abstracting/conceptualizing skills” and “initiating skills”; and 68.2% “advising” and “planning” skills. All of the above fall within the “administrative” category.

Research skills of particular concern to the Humanities faculty are the following: “classifying” (95.5%), “inspecting” (95.5%), “compiling” (86.4%), “creating” (86.4%), “investigating” (86.4%), and “collecting” (72.7%).

The most decisive career-related skill area taught by Humanities disciplines seems to be in the communicating area. Only two of the fourteen (14) skills listed in this area were taught by less than half of those responding. “Corresponding”, “explaining”, “interpreting”, “persuading”, “rewriting”, and “speaking” are taught or required by the majority of Humanities faculty.

In the remaining two areas, coordinating and examining, only two skills (both in the examining area) were taught or required by a significant number of respondents: “evaluating” (72.7%) and “reviewing” (95.5%).

A cursory look at the results for Math/Science shows greatest strength for career skill development in the area of research, 91.7%. Only administrative skills of the remaining four (4) categories netted over 50% in the returns from Science/Math teachers.

Interestingly, Social Science registered relatively high skill development in all areas. Both administrative and research skills topped 84% while communication and examining skills exceeded 71%. Some 58% reported teaching or requiring demonstration of coordinating skills.
If additional surveys, already mailed out, corroborate the above statistics, it is safe to say that Liberal Arts faculty believe that study in their disciplines definitely develops career-related skills. To translate that knowledge into useful reference for job requires, however, an additional step.

That step can be taken if a relationship is made between the sixty (60) identified career skills in the survey and the worker functions listed in Appendix A, “Explanation of Relationships Within Data, People, Things, Hierarchies”, of the Dictionary of Occupational Titles.

Our preliminary returns point to some thirteen (13) “Areas of Work” within which two-year liberal arts students might find employment. Since liberal arts students tend to concentrate in “data” and “people” categories (as defined in the DOT), the “Business Relations”, “Education and Training”, “Investigating”, and “Managerial and Supervising Work” are the types of areas in which students would find employment.

Within the areas of work, over thirty-five (35) “worker trait groups” which require the inventory skills can be identified. “Business Relations”, “Clerical Work”, “Investigating, Inspecting, Testing”, “Managerial and Supervisory Work”, “Scheduling”, “Dispatching”, “Contract Negotiating”, “Purchase and Sales”, and numerous others call for skills taught through Liberal Arts study. Even restricting other variables, including the General Education Development Level and the Specific Vocational Preparation Length, did not upset these conclusions.

While all of the above statistics are based on limited returns, definite trends are evident. This survey confirms Linwood Orange’s study - liberal arts graduates do learn career related skills. With knowledge of these skills available before a student selects a program of study, a more career related program can be designed. In addition, students can select career areas knowing that their study in liberal arts will be of benefit to that career and indeed be an apt preparation for it.


2. The ten skills identified by Orange are:
   1. To speak well in public
   2. To handle office paperwork with grammatical accuracy, conciseness, and clarity.
   3. To edit or rewrite material that has been prepared by technical personnel
   4. To analyze, interpret, reorganize, and rephrase material.
   5. To use general and specialized reference materials in preparing well-documented reports
   6. To analyze and interpret unpublished data of various kinds in preparing well-documented reports
   7. To use research materials with creativity and originality
   8. To speak and write a foreign language fluently.
   9. To become reasonably knowledgeable in areas in which there has been no previous training
   10. To present an argument or to debate logically, succinctly, and clearly.

3. The specific skills listed under each category follows:

   Administering
Abstracting/Conceptualizing
Advising
Appraising
Budgeting
Decision Making
Initiating
Interviewing
Managing
Mediating
Negotiating
Organizing
Planning
Supervising
Researching
Analyzing
Classifying
Collecting
Compiling
Creating
Inspecting
Investigating
Laboratory Working
Measuring
Processing
Recording
Updating
Communicating
Corresponding
Displaying
Exhibiting
Explaining
Interpreting
Persuading
Politicking
Promoting
Proposal Writing
Rewriting
Selling
Speaking
Translating
Predicting
Coordinating
Calculating
Committee Work
Controlling
Designing
Developing Models
Estimating
Group Facilitating
Monitoring
Operating
Programming
Timing
Examining
Coaching
Counseling
Dispensing
Evaluating
Reviewing

4. Identification of occupational areas related to skills will be undertaken when the 4th edition of the *Dictionary of Occupational Titles* is available.

5. Based upon the 3rd Edition of the *Dictionary of Occupational Titles*. 
INTERDISCIPLINARY STUDY:
The Ideal and the Real

W.J. Reeves

This study will examine the various interdisciplinary programs in operation in major universities, focusing on the methods of organization and detailing the problems of existence of such programs.

There are many ways to organize interdisciplinary programs, but the following methods appear most often:
1. Significant Time Periods
2. Area Studies
3. Humanities and the Professions
4. Topics

A description of these methods is necessary.

The first organizational device to be examined is the Time Period. The thesis of this approach is that the selection of a certain period of time gives a program a definite structure and allows students to observe the various disciplines in operation in a controlled context. One such program is the New School of Liberal Arts (NSLA) at Brooklyn College of CUNY. In 1972 Brooklyn College created the New School of Liberal Arts, a two year program for freshmen and sophomores which has an interdisciplinary format.

NSLA offers 64 credits (of the 128 needed for graduation). The students there spend two years in the program and fulfill all requirements of general education. At the junior year they move into their major field of study. At NSLA a
student selects, each semester, one of five historical time periods (Ancient, Medieval, Renaissance, Age of Revolutions, 20th Century) and then takes four courses (Art or Music, Science, Literature, History/Philosophy) in that one time period. The faculty can easily coordinate their classes since they teach the same students. If a student would select 20th Century, he would have a schedule of art history or musicology, science (chemistry, biology or physics), literature, and history/philosophy, all of which would deal with the same period of time. Usually the faculty will keep the literature, art and history in the same area. Thus a history teacher who specializes in American history would team with a professor of literature whose concentration was 20th century American. For an example of a coordinated approach involving science and literature, see D.A. Labianca and W.J. Reeves, "Teaching The Moonstone: An Interdisciplinary Approach", Exercise Exchange, Fall 1975 or "Sherlock Holmes and his Compulsive Use of Cocaine", Science Education (Spring/1976).

The second type of organizational method—Area Studies—is closely related to the time period concept. The idea here is to focus the study on a particular area and, usually, a particular time. Examples would be the programs at Denver University and the University of Pennsylvania. At Denver University some 11 significant areas have been selected for study. Examples are as follows: Classical Athens, Mexico in the 20th Century, Sung China, France of the Enlightenment and Revolution. The format allows for detailed treatment of an important subject and affords opportunity for interdisciplinary teaching.

The University of Pennsylvania began an Area Studies program in 1975. Their program concentrates, in one semester, on one of several areas—Israel, China, India, Russia, Germany. The program is not meant to be an area for specialist training but is directed toward a general education objective. With each of the areas to be studied some aspects of Time Period organization are used. For example the module treating India focuses on India since 1947, the unit on Germany examines the rise of German Nationalism dating from the 19th century. One interesting part of the program is the introduction of language study. The German Area Module offers an intensive course in language, and this study is then related to the analysis of the culture.

Another method of organization is to coordinate a humanities program with a professional program. The University of Florida and Oregon State University have programs which relate humanities and the professions.

Oregon State University has a program entitled the Humanities Development Program with a specific concentration on humanities and the professions. The thesis of their program is explained by the following quotation from their bulletin:

We believe that students in the sciences and the professional schools need a better understanding of the values fundamental to their disciplines and increasingly fundamental to their future professional practices. At the same time we feel that students and faculty in the humanities need to acquire a better understanding of science and technology, since humanistic critiques of these fields must be informed by a thorough understanding of the nature and the impact of those pursuits.

The following are examples of some of the courses offered at Oregon State University:
This program is slated to begin in 1979-80. The advantage of this type of organization for the humanist is that a definite group of good students is made available for the program.

The University of Florida also has a Humanities and Professions Program which began in 1975. The program at Florida relates the humanities and medicine, law, engineering and business. In their grant proposal the objectives of the program are established as follows:

The objective to be accomplished with NEH funds is the creation of a new liberal arts program of courses designed to relate the substance and the methods of the humanities disciplines to the issues and concerns of the professional fields.

The module involving the humanities and human medicine is especially interesting. It is directed toward incoming medical students. Quoting from their bulletin, the "Division of Social Science and Humanities within the Department of Community Health and Family Medicine is built on the conviction that what is needed is the introduction of the concepts, the perspectives, the methodologies and to some extent the materials of appropriate humanistic and social scientific disciplines into medical education."

Some of the courses offered in this program are as follows:

*Humanities and Human Medicine* —  
Humans and Medicine  
History of Medicine in U.S.  
Philosophy and Counseling

*Humanities and Law* —  
Humanistic Perspectives on the Law  
Art, the Intellectual and the Law  
The Courtroom as Theatre

*Business* —  
Human Images in Economic Thought

The final method of organization is the use of *Topics*. Three schools with interdisciplinary programs organized by the method of *Topics* are University of Notre Dame, San Francisco State, and University of Wyoming.

The program at Notre Dame is directed toward freshmen and has traditionally attracted pre-med students who want humanities courses other than freshman composition and literature survey. The following is the outline for the two-semester Freshmen Humanities Seminar at Notre Dame; the course is organized around the concept of a journey of the self.

I. Initiation:  
a. *The Epic of Gilgamesh*  
b. Genesis 1-11
II. Innocence and Experience
   a. Hawthorne, *The Celestial Railroad and other Stories*
   b. Burgess, *A Clockwork Orange*
   c. Blake, *Songs of Innocence and Experience*
   d. Shakespeare, *Othello*

III. Fathers and Founders
   a. Genesis 12-40 — Abraham, Isaac, Jacob
   b. *The Autobiography of Malcolm X*
   c. Exodus 1-24, Numbers 9-14, 20, Deuteronomy

IV. Myth and Reality
   a. *The Constitution of the United States*
   b. *The Communist Manifesto*
   c. *The Prince*
   d. *Arms of the Night*
   e. "The Apology": The Trial of Socrates
   f. "The Crito" "The Phaedo"
   g. "The Gospel According to Mark"

V. The Individual Quest
   a. "The Grand Inquisitor"
   b. *A Portrait of the Artist as a Young Man*
   c. "The Marriage of Heaven and Hell"
   d. *Heart of Darkness*

VI. The Fall
   a. "Waiting for Godot"
   b. *The Trial*
   c. The Book of Job

VII. Rebirth
   a. *Siddhartha*
   b. *Memories, Dreams, Reflections*
   c. *The Rainbow*
   d. *Fear and Trembling*
   e. The Ninth Symphony

The attraction of this arrangement is the developmental aspect. Each part builds upon the previous part, and the students are truly taken on a journey.

San Francisco State has an interdisciplinary program entitled the Science/ Humanities Convergence Program (NEXA). The program began in 1976 and will offer 18 courses by 1980. NEXA is open to any student within the University. Their "Topic System" is organized by the use of three groups of topics — Concepts, Sequences, Issues. Before taking the *Sequences Courses* it is recommended that a student take one of the *Concepts Courses* — "Cosmologies and Worldviews," "Mythic and Scientific Thought," "Time in Human Consciousness."

The *Sequences Courses*, while essentially topic courses, have a Time Period aspect. The courses are as follows:

The Copernican Revolution
The Newtonian Revolution
The Darwinian Revolution
The Einsteinian Revolution
The Freudian Revolution.

Completing the NEXA program are the Issues Courses: “Literature, Art and Physics,” “Animal-Human Behavior,” “Split Brain/Split Culture.”

The method of instruction is primarily team-teaching. For example the Newtonian Revolution course features a professor of mathematics and a professor of English and subject matter ranging from Pope, Swift and Sterne to Newton, Locke and Bentham.

One special feature of the NEXA program at San Francisco State is the use of public presentations as a means of extending their “interdisciplinary mission.” As one example NEXA offered the California Symposium on Science and Human Values which focused on the topic “Sociobiology: Implications for Human Studies” during the summer, 1977.

The final example of an interdisciplinary program organized by Topics is the Humanities Semester of the University of Wyoming. The program offers a cluster of interdisciplinary courses (9 or 12 Humanities credits) which focuses on a single topic. The program is open to all students who have completed 15 hours of credit and is offered the Spring Semester of each year. During the Fall, the faculty plan the course and recruit students. For Spring, 1978, the Humanities Semester focused on the topic of Time and was entitled Studies in Time. The program emphasizes the integration of the humanities and the sciences. The Humanities Semester also has a special feature. One week of the semester is set aside for a lecture series. This series, entitled the Practicum, extends the classroom consideration of the topic by means of guest lecturers, films, exhibits and performances.

These, then, are some examples of the “ideal” aspects of interdisciplinary study. To achieve these ideals many of the above universities have obtained large federal grants. At one time NEH offered grants up to $1,000,000.00 for five years to support interdisciplinary programs. Today these grants have been scaled down to provide Planning Grants of up to $50,000.00 for initiating programs and Development Grants of approximately $100,000.00 a year for two to three years. As a university begins to apply for such grants, the ideal assumes less importance and begins to be overshadowed by the real.

Given the examples of success, any of the four methods explained above will work as the idea for an interdisciplinary program. The more important considerations are the real, nuts and bolts issues connected with the development of new programs. The following are “real” considerations which must be dealt with if an interdisciplinary program is going to survive:

1. The Level of the Students in the Program
2. The Goals of the Program
3. The Nature of the Faculty
4. Departmental Support
5. Administrative Support.

One of the first considerations in the planning of an interdisciplinary program is the level of students. Since the program will be taking its place with established programs, a spot must be found for it. If the choice is made to focus on freshmen and sophomores, then the ideal must be bent to that type of student.
Interdisciplinary study by its very nature is difficult. Its thesis is that a problem or topic can be examined better if more than one discipline is used in the analysis. Entering students have not mastered any discipline and will not bring to the classes any definite perspectives. Thus, the subject matter must be basic; the analyses and approaches modest in their demands. Further, if an attempt is made to fit an interdisciplinary program for freshmen/sophomores, then the spectre of skills appears. Such courses would be equivalencies for introductory courses and thus would have to assume the same responsibility for teaching writing, reading, mathematics, appreciations, etc. as do the other introductory courses. If the courses do not assume such responsibility, then they will not be granted requirement-satisfying status and students will not take the courses. Classes aimed at upperclassmen also encounter problems. Students at the upper divisions level usually have full schedules. Thus the interdisciplinary classes will be used as electives. There is some difficulty in accomplishing significant interdisciplinary work in one three-hour class offered to students with four other classes. The interdisciplinary course will be regarded as of fringe importance and time, effort, and status will be given to the courses in the student's major field.

Any interdisciplinary program must identify definite goals which students and faculty will perceive as worthy. Interdisciplinary courses should fulfill general education requirements or they should lead to a major or minor concentration. The programs cannot survive if they are presented as "interesting," "innovative," "experimental," "a change from structure," etc. Those bromides might have worked in the 1960's but today new courses must have academic worth or degree-generating potential or they will not be supported.

But say that a good idea was available and that grant money was obtained and that a group of students was identified and that worthy goals were established, who would teach such courses? This is the most difficult of the real considerations. Grants do not pay salaries. They will provide teaching assistants, secretaries, equipment, rentals, guest lecturers, faculty travel and the like, but they will not pay the university for faculty to teach in the programs. Two options are open: the university can hire new faculty to teach in the programs; the departments can release faculty to the programs. The latter is the normal solution. What a headache is released time! First of all, the departments will be reluctant to release faculty. They will perceive that if they release faculty they are notifying the administration that they are overstaffed. Second, the faculty members who are released will still have departmental requirements. New courses take time away from research and since research is necessary for success in the university many faculty members see participation in new programs as harmful. Third, released faculty are not permanent faculty. Thus interdisciplinary programs experience a great deal of turnover and do not achieve the stability needed for success.

This matter of released time leads to the next point — departmental support. The humanities are in trouble in universities — that is a fact. Each year the enrollments in non-required courses go down. Any new program which has courses which are equivalencies for existing courses will be viewed as a challenge by the departments, and every effort will be made to sabotage the programs. Poor faculty will be donated; advisors will criticize the program or simply not mention it; department chairmen will inveigh with deans and vice-presidents that interdisciplinary programs are just fads and that what is
needed are more survey courses. Anyone planning an interdisciplinary pro-
gram must first secure the support of the departments or failure is inevitable. 
The way to secure such help is to create a program which will bring new 
students to humanities classes. Most humanities departments, English in par-
ticular, would be amenable to interdisciplinary courses which could attract 
students at the upper-division level. The difficulty here is that a balance must 
be found between satisfying departments and attracting students.

But the successful planner cannot rely only on departmental support. The 
senior administration must support the program in word and deed. If pressure 
is needed, then a strong arm must be found. In every one of the successful 
programs listed above, support from the senior administration was present. If a 
department has constantly been experiencing a decline in students in non-
required courses, then a change must be made. But departments change only on 
the threat of death. A Dean or a Vice-president is needed to step in and “advise” 
the department to support the interdisciplinary program with good people, 
good advising and advertisement.

What would be an example of a good area for an interdisciplinary program? I 
would advise a sophomore level core of courses involving humanities and the 
sciences organized around a topic. Why sophomores? In terms of an English 
Department the new program would not compete with their bread and butter 
course — freshman composition. Further, most universities have a 
humanities/fine arts requirement so the new course could be required. Which 
science? Physics. Why? Well, most physics departments have little for their 
physicists to do in terms of teaching so released time is usually possible. And 
physicists can range from ancient times to the present in terms of subjects and 
thus have ready-made content for coordination with the humanities. Finally, 
physics is difficult and respected in the university. No one will accuse a 
program of being superficial and gimcrack if Tycho, Newton and Rutherford 
are on the syllabus. Why topics? With topics small blocks of interdisciplinary 
courses can be offered. If the interdisciplinary program is too large, it will 
interfere with existing programs. A team-taught, coordinated block of two 
classes (six hours) will not distort a student’s program. The two-class block is 
large enough to be significant but not large enough to discourage students from 
taking the courses.

As discouraging as some of the above comments are, the possibilities are still 
good for interdisciplinary study. Most educators would admit that general 
education is a shambles. Interdisciplinary programs can provide the needed 
general background. What is needed for success is a recognition of the ideal and 
real aspects involved with interdisciplinary study.
GENERAL EDUCATION AND INTERDISCIPLINARY STUDIES IN THE ARTS

Dennis J. Sporre, Director

General Education in the Arts

The conservatory approach to education in the arts is commonplace. Even in land-grant institutions which purportedly espouse a liberal arts or general education (there are differences between the two) the tendency in arts instruction has been to shape the curriculum into more and more specificity, so that even at the undergraduate level the student is given an option to choose, within his major, rather narrow specializations. The resultant increase in specialty courses and their need for staffing constantly refires the age-old arguments relating to general and liberal education and how, within various matrixes, general students or non-majors can be accommodated. What I would like to do here is to suggest a practical possibility for course development in interdisciplinary general education in the arts. Prior to that, and by way of introduction, however, it is important to deal with some philosophical prerequisites concerning relationships among artists, artworks, aesthetics and non-artists.

There is a persistent attitude, as Hebert Read puts it, that "Common to both sophisticated and simple people is the assumption that whatever art may be, it is a specialist or professional activity of no direct concern to the average man." ("The Necessity of Art," in Curricular Considerations for Visual Arts Education: Rationale, Development and Evaluation, George W. Hardiman and Theodore Zernich, editors, Stipes Publishing Company, 1974 p. 7). Such an attitude is
perhaps more firmly entrenched in the arts community than it is even in society in general. Its result is a resistance to any idea which suggests that art education must consist of more than the conservatory, into which a few non-artists are ingested, whirled around, and then spit out in the name of liberal or general education. However, there is little question that aesthetics plays a major role in society as a whole. As I have suggested elsewhere (see Dennis J. Sporre, *Perceiving the Arts: An Introduction*, Kendall/Hunt Publishers, 1978, p. 8), we all co-habit with the arts whether or not we traffic in galleries, theatres, or concert halls. Individuals put on color-coordinated, matching socks in the morning. They wear clothes and make-up which flatter their physiognomy. They make aesthetic (artistic?) decisions constantly, not merely when they are in the concert hall or in the gallery. An aesthetic education, which is at least part of an arts education, is as important in the running of a business and the design and decoration of a home as it is in the production of a ballet. A store's floor plan, sign, and advertising for example, are important financial and artistic matters, and trusting them to others can be precarious. Aesthetics is important in areas of daily life that touch people's pocketbooks, and concerns matters perhaps more permeating (if not more mundane) than formal artworks. Therefore, while the ultimate relationships among artists, artworks, aesthetics and non-artists (or society in general) are complex and difficult to sort out, certainly the relationship of the non-artist to the arts and aesthetics is different from that of the artist to his art. As a result, the formal, i.e., educational, development of the non-artist obviously should be different from that of the artist. As valuable as the participatory experience is in achieving a full understanding of the aesthetic and creative process, dabbling with a paint brush or shifting scenery does not teach a non-arts student to function in his most important and relevant relationship with the arts, that is, as an informed audience member or respondent. So for all intents and purposes, in the classroom setting general education and the conservatory are mutually exclusive. Artists and audiences cannot be trained in the same classroom. (In terms of the overview of total aesthetic education, the conservatory and general education go hand in hand. One cannot have one without the other. Despite contentions to the contrary, it is impossible in our society for an artist to do his work without a receptive and perceptive audience, which consists of a broader spectrum of society than the artist's own peers. Likewise, and perhaps in the long run more importantly, it is impossible for an audience to adequately appreciate and support the arts without having the best of the art form available for its time and ticket price.)

What these considerations lead to is a practical matter of course development for general education in the arts. The first question to be raised is, in what or in whose classroom should general education take place? I wish to be very specific in my connotations here. By general education I mean specifically designed courses for non-majors, and not open courses for majors and non-majors alike. Obviously no pat answer to the previous question exists.

Every college or university has its own individual curricular, fiscal, or administrative qualities which influence how general education in the arts can be accommodated. I would like, however, to suggest a possibility which meets a number of philosophical and practical needs, and offers an additional option to the standard music, theatre, and art appreciation courses taught in the traditional single-disciplinary departments. It is very difficult in the current curricular state of affairs for a student to elect a full range of courses to broaden his
aesthetic horizons. For the past fifteen years The Pennsylvania State University has centered its efforts in general education in the arts in a separate program which offers interdisciplinary arts courses at beginning and advanced levels. Each course covers some aspect of the interrelationships of visual arts, music, theatre, opera, dance, film, architecture and landscape architecture. Each course is taught by a single instructor (as opposed to team teaching) so as to keep course goals unified and methodology of subject matter treatment consistent, as well as to handle problems in load distribution, etc. Graduate assistants and outside experts are used on occasion to help plug the holes in the instructor’s expertise.

Without dealing with problems involving breadth versus depth of experience and generalists versus specialists, let me continue by stating that as a curricular option, this approach gives the student the opportunity to broaden his horizons in a three-unit course in subject areas which normally would require twenty-one or more units of credit.

What is most important pertaining to course development in general education in the arts is not specificity or superficiality, but rather the delineation of specific goals and the adoption of functional and productive methods of meeting those goals in order to introduce the general student to the arts. Concerning goals, it is most essential to note that general education should not try to make demi-artists out of non-majors. They are not artists, never will be artists, and if they were, they would be taking another approach to their education than that which brings them to a general education course. Taking a course in general medicine does not make one a physician or even a paramedic. It does, however, create a better understanding of the field of medicine, how medicine can relate to life, and how better health can be achieved. The key to avoiding the creation of over-confident, under-educated, know-it-alls is the careful articulation of sensible course objectives. Goals for general education in the arts should, first of all, focus on an attempt to solve a practical problem: That of packaging the best information possible relative to the arts into one or more college courses that somehow fit into that very brief 125 hours of the undergraduate curriculum, in which completion of a “major” leaves one little more than a “dabbler”. In addition, these goals should focus on an attempt to take a student from the realm of a familiar experience over a bridge into the realm of the unfamiliar, that is, the arts and aesthetics, or from a cognitive world into a cognitive affective one. General education should try to open doors to life-long learning (if it does nothing more than that, it will have accomplished a good deal). One of my staff recently had a former student present him with a lovely, very expensive volume on architecture as a reward for the benefits the student received from his course. If I translate correctly, the student, who worked in the construction trades, found that, having had this general arts course, he looked at the world in a completely different way. His whole method of observation had changed because of the doors that were opened in that course. So to repeat, the attempt is not to try to make artists, but rather to make life-long students of and respondents to the arts, to make them want more, want to discover more, want to see more, want to get into the habit of the arts. Attending the theatre, attending concerts, and going to museums is habitual. It requires getting up and getting out to do it. Once one is in the habit, it comes naturally and requires little thought or effort. If individuals can be stimulated into the habit of going to the
arts and interested enough in the arts so that they want to learn more, then the total value of the arts will become apparent to them and they will give themselves, or seek out, the substantive kind of instruction that cannot be given in a broad survey.

It is difficult at this point to be specific about goals, because they must be related to specific courses, and to be worthwhile, specific courses should be related to curricula. Curricula, in turn relate to students, and the variety of backgrounds likely to be encountered at a large land-grant state university is considerably different from that of a small, private liberal arts college. Every course should have a clientele in mind, and a level of approach at its base. These factors are the stumbling blocks in most course development. While in traditional disciplines courses can spring from the specific interests and expertise of an individual professor, great difficulty can be avoided if those interests and expertise have curricular relationships. Most certainly, courses in general education in the arts must spring, not from pet theories and interests, but genuine understanding of the levels of aesthetic sophistication at which the graduate of a college or university can reasonably be expected to function.

To be specific, let me deal in what follows with the goals and methodology for an introductory-level course in general education in the arts, such as is taught at Penn State. The course referred to touches upon art as a process, product, and experience, but it does so only in terms of elements which lend themselves to classroom study. The goal of the course is to enhance aesthetic perception by examining works of art, by discerning what can be seen and heard in them, by understanding what those elements are called, and by determining how the artwork creates a response in the viewer or listener. The course is not a course in taste-making or connoisseurship. "Good" art and "bad" art or their characteristics are not discussed.

The methodology for the course is cognitive. We live in a cognitive world. The things with which we are most familiar and which we can grasp most easily are those things which are cognitive in nature. Some individuals are fond of referring to aesthetic education as "the education of half-wits." They refer, of course, to the fact that one hemisphere of the brain deals with cognitive information and the other, with affective response. The contention is that without the arts — affective experience — individuals are educated to utilize only half their cerebral potential. I could not agree more. However, an emphasis on feelings and emotions is a questionable tack when used as a pedagogic method for introducing individuals to the arts. If general education seeks to be the bridge from the world of the familiar into the world of the unfamiliar, then starting with those elements of the arts which can be handled with the tools of perception with which the uninitiated has been working all his life seems to be a more logical and productive means of introduction. This does not in any way deny the role, the importance, nor the desirability of affective response. If instruction is done properly, the affective and expressive layers of response will be enhanced and will complement the cognitive. Opening doors to areas of learning which are unfamiliar and in many cases unpopular, is not easy. Consequently, questions such as "Do you like it?" or "How does it make you feel?" are as absurd an introduction to a play as they would be to a new personal acquaintance. Such questions usually evoke only confusion, frustration, and resentment. A more reasonable question is "What can you see or hear in it?" From that point of departure the individual finds that he can recognize forms.
patterns, colors, and movement. He becomes comfortable in that knowledge and is willing to go on. When a student discovers that it is not difficult to recognize polyphony, homophony, and monophony, he then begins to acquire a taste for active listening and moves one step closer to full affective and informed participation in the art form. The value of the cognitive approach is that one can show the arts as vehicles of communication relevant to individuals who never have had any exposure to them. One can show that quality in the arts is not a remote, elitist utopia to be treated as one does a trip to the dentist. That is, you know it is supposed to be good for you, but you are frightened to death to go. Rather, the arts are a complex arrangement of levels of involvement and response. An enlightened experience in the arts can begin at the level of complete ignorance as well as at the level of thorough sophistication. The ability to count to three allows understanding of something. An MD degree is not required to understand how to take care of one’s health, and years of training or participation are not required to begin to understand what the arts are about and to love the arts and to respond to them. Cognition provides that bridge to the arts from a mechanized, familiar world.

In a course such as an introductory course in the arts for the general student, one needs to have a consistent approach as he moves from discipline to discipline. Terminology, frequently used as a tool for interrelating the arts, I find to be specious since the nuances and general, if not antithetical, differences among similar terms in separate disciplines tend to cause confusion for the beginner. I prefer to use Harry Broudy’s levels of aesthetic response: 1) What is it? 2) How is it put together? 3) How does it stimulate the senses? 4) What does it mean to me? The first three of these can be studied cognitively. The fourth I leave to the student’s future development.

Finally, within the classroom setting any methodology is incomplete which does not deal with the difficult and perplexing problems of testing students’ understanding. Such is the case with the testing in the arts. In the interest of brevity I simply would prefer to Warren Smith’s excellent article on “Testing in the Arts” (Warren S. Smith, “Testing in the Arts”, Interdisciplinary Perspectives, VIII, No. 2 (Winter, 1976-77), pp. 25-32.) in which the application of perceptual skills becomes the focal point of the examination. In the classroom the student studies specific works, learning to discern how the artist has used such qualities as line, form, mass, color, repetition and unity, and how these qualities are expressed in the artworks. The examination requires him to compare works he has studied in class to works which he has not seen before. The examination questions deal with true and false statements regarding which painting, for example, has a more dynamic use of line, or which sculpture makes a more significant use of negative space. This kind of testing, which lies somewhere between subjectivity and objectivity, has proven itself a valid instrument via the Kud-Richardson test of reliability.

These comparisons form roughly fifty-percent of the examination. The remainder is comprised of objective questions dealing with definitions and background material found in the textbook, a basic reference encompassing all the arts. The text is designed as a springboard for classroom analysis and discussion and provides the student with background information such as the characteristics of a symphony so that class time need not be devoted to presenting information which can be communicated more effectively and more quickly in written than in oral form.
It is clear that the place of general education in the arts in the academic curriculum is not easily determined. In addition to the attitudinal problems to which I have briefly referred, there are significant and sometimes overriding practical problems, problems of facilities, staff, and budgets. Certainly general education in the arts must be concerned with the larger questions of the relationship of the arts to society and the differences between artists and respondents vis a vis, artworks and aesthetics. Elitism, popularism, and democratism, "buzz" words currently in vogue, must be contended with, and must be handled sensitively. Finally, goals and methodology are critical to general education in the arts, and must account for the fact that in the United States, societal arts appreciation has a seminal influence on the future quality of all artistic endeavors. Whether or not federal subsidies are forthcoming or even desirable, societal understanding and support for the arts is a necessity.
HUMANISTIC BIOLOGY: A GENERAL EDUCATION APPROACH

Alwynelle S. Ahl, Helen B. Hiscoe
Lawrence R. Krupka, and Andrew McClary

INTRODUCTION

In modern man's attempt to understand human nature, two major modes of perceiving human experience, the humanistic and scientific, have often been in conflict. C.P. Snow labelled this dichotomy "the two cultures." As the power of science and accompanying technology have grown in the past forty years, the distance between the two cultures has widened. Reflecting concern about this cleavage, some scientists have attempted to incorporate humanistic perspectives and goals into science. In the area of biology, this humanistic concern is demonstrated by such groups as the Institute of Society, Ethics, and the Life Sciences (Hastings-on-Hudson) and its highly successful Hastings Center Reports. In addition, new journals such as the Journal of Medical Ethics indicate increasing concern with the problem of humanizing science. A plethora of books emphasizing ethical implications of applied biology include Taylor's The Biological Time Bomb (1968), Augenstein's Come Let Us Play God (1969), Potter's Bioethics: Bridge to the Future, (1971), Fletcher's The Ethics of Genetic Control: Ending Reproductive Roulette, (1974), and Goodfield's Playing God: Genetic Engineering and the Manipulation of Life (1977). However, as with many things which seem quite new, inspection shows that these books represent only a new awareness of concerns which have long been of interest to mankind. For example, Goodfield reports that in the 17th century, more than one-third of the papers of the Royal Society were about social problems and the relationship of science to them.
Medical and nursing school curricula often include courses or units on ethics. Humanistic approaches to biology have been incorporated into courses for undergraduates as well, both for the biology major and the non-major.

At Michigan State University some of the faculty teaching General Education Natural Science have developed a cluster of courses which address these humanistic concerns. These courses are briefly described in Table I.

**TABLE I. HUMANISTIC BIOLOGY COURSES IN THE DEPARTMENT OF NATURAL SCIENCE AT MICHIGAN STATE UNIVERSITY**

*Biototechnology of Health* deals with this issue: contemporary scientific insights have produced a technology with increasing power to alter the human system and may have the potential to completely redesign it. How can we learn to use this ability in a humanistic way?

*Biological and Social Aspects of Human Reproduction* focuses on the ways we are able to modify our reproductive processes. The problem of iatrogenesis, the ethics of developing new scientific knowledge, the criteria of humanhood, and the conflicts between social and individual rights are considered.

*Bioecology of Health* asks a pervasive human question: what is health? It suggests that biological science, particularly ecology and evolution helps us to answer this question. The course then considers the human implications of these answers.

*Drugs and Society* is concerned with the unique human characteristic of alteration of consciousness obtained by the use of certain chemical substances.

*Biosocial Evolution of Man* explores the fundamental question of what it means to be human. Principles of evolutionary biology are applied to the study of human behavior and to our relationship to other species.

*The New Genetics and Society* considers the social and ethical issues related to our increasing control of heredity.

*Brain, Mind, and Culture* studies the human brain from an evolutionary perspective and analyzes conflicts that arise from its history.

*Chemicals, Health, and the Consumer* provides an examination of the scientific basis for decisions affecting individual and public health. It emphasizes the use of scientific principles to make rational judgments in these areas.

**CHARACTERISTICS OF HUMANISTIC BIOLOGY**

Our humanistic biology courses address both broad philosophical and personal issues. Not all of our courses address all equally, but all courses stress some of the issues listed in Table II. Our classes stress that science, like all human activities, is rooted in and draws upon basic value judgments concerning ourselves and the world. The Reverend Theodore M. Hesburgh has stated that:

> it is the value judgments that ultimately bring the social sciences to life and make them more meaningful in liberating those who study
them. The bursting knowledge of the [natural] sciences is really power to liberate mankind and the price of this liberation is value: The value to use the power of science for the humanization rather than the destruction of mankind.⁶

This quotation, in contrast to C.P. Snow's view, suggests to us that science and values are closely linked and that each is dependent upon the other for its impact. We are suggesting that general education science courses should emphasize the humanistic tradition, which places man and his accomplishments and ideals in a central position. For example, a humanistic biology course should concern itself with the life of man in socio-cultural and biological contexts. A humanistic approach is holistic and should explore specific characteristics and qualities of man that can be dealt with through science as well as those that transcend it (beliefs, faith, values, morals, and ethics). These cannot be empirically or statistically verified any more than the sense of beauty can be dealt with scientifically.

New developments in science continually force philosophers and theologians to reexamine the nature of man and morality. We believe that there is a fine line between science and philosophy and that the humanistic biologist can link biology and philosophy by probing the theological and ethical implications of scientific discoveries. Humanistic biology differs from specialized biology by its broad horizons, stressing the interrelatedness of science, art, religion, and literature. The inclusion of such humanistic emphasis in science courses might help to counteract the criticism leveled at science and scientists for being amoral.

### TABLE II. HUMANISTIC BIOLOGY: CONCERNS AND GOALS

#### A. To Increase Perception, Knowledge and Understanding of:

1. Man as part of the natural world
2. Man as part of a continuum, beginning in the distant past and continuing into the indefinite future
3. Man as more than the sum of his parts - reductionism versus hierarchical organization
4. Man's genetic heritage
5. Man's environmental heritage (the ecosystem)
6. The interaction of man's genetics and environment - we are partially deterministic and partially indeterministic
7. Man's technology and how it modifies human existence
8. Self-understanding, awareness and the nature of humanness and personhood

#### B. To Use This Knowledge as a Basis for Examining Values and Making Decisions Regarding:

1. Personal health
2. Reproduction
3. Man's place in nature
4. Adaptation and coping with stress (lifestyles)
5. Technology as it modifies and creates human values
6. “Permissible” scientific activities
7. The meaning of humanness and personhood
8. Human social and political behavior

ISSUES IN HUMANISTIC BIOLOGY

Man's ever more successful pursuit of insights into his own nature and that of the world around him has given him ever greater power to intervene. While this capacity has solved some problems, it has also created new ones. In a finite system, alteration of one part produces sometimes unforeseen perturbations in other parts of the system. Exploration of the impact of human intervention based on scientific knowledge reveals several issues: iatrogenesis (unforeseen problems arising from well-intentioned use of technology), the tension between self and society, the frustrations of halfway technologies, the problems raised by our ability to change human nature itself, and the conflict between biological nature and cultural environment.
SOME THOUGHTS ON
INTERDISCIPLINARY STUDIES

Sidney F. Parkam and Peter W. Graham

The vogue for interdisciplinary courses has led our more crusty and conservative colleagues to complain that such programs represent a mere repackaging of traditional courses, a process that diminishes the value the student receives from traditional courses without broadening or integrating his knowledge. Too often this criticism is just. We should like to argue that a genuinely interdisciplinary approach does not repackaging but restructures knowledge in such a way that students are led to consider the nature of knowledge itself and thus, we hope, to think about their own thinking. Such reflection seems to us a decidedly traditional goal of liberal education.

Before we discuss the sorts of courses we consider truly interdisciplinary, let us examine the "additive" kind of course that incites the repackaging criticism. Imagine, for instance, a course called "The Black Experience in America," taught by one supervising instructor and a number of guest lecturers from various disciplines, including literature, sociology, and history. The reading list for this course might include slave narratives or Frederick Douglass's Autobiography, Baldwin’s The Fire Next Time, Ellison's The Invisible Man, Genovese's Roll On, Jordan and Myrdal's American Dilemma. Each guest professor explains the works in his discipline, leads discussion of the text, and offers whatever general insights he may have. Such a course is in reality three mini-courses, one each in literature, history, and sociology. The course leader, no doubt, will attempt to draw connections as he marshals his parade of authorities, but unless he advances a sincere investigation of the relations among the epistemologies of the various disciplines, he leaves the student with three discrete bodies of knowledge and the vague hope that they form a unified whole neither greater
than nor different from the sum of their parts. It would be difficult to defend this course against the argument that the student would benefit as much or more from three separate courses taught within traditional departments.

Simple juxtaposition of subject matter does not constitute an interdisciplinary course. Rather, interdisciplinary ventures should order such juxtapositions into intelligible structures that establish connections among the various materials and the epistemologies from which they derive. We are using “structure” in the specific sense that it relates to the theories of structuralism as developed in anthropology, psychology, linguistics, and literary studies. Jean Piaget’s definition of this approach is hard to improve on: “It [the structuralist approach] adopts from the start a relational perspective, according to which it is neither the elements nor a whole that comes about in a manner one knows not how, but the relations among elements that count. In other words, the logical procedures or natural processes by which the whole is formed are primary.”

Piaget goes on to argue that three qualities — wholeness, transformation, and self-regulation — define a structure.

A number of problems arise when we apply this approach to primary phenomena. In so short a space as this we cannot address the problems directly; rather, we wish to hypothesize that academic disciplines are fictional constructs that follow Piaget’s definition of structure. Events occur in the world of men and phenomena; history and physics are only conventional and systematic ways of discussing them. Men live in societies; sociology exists in the methods of its practitioners. Novels and poems are written; literature is the creation of critics and readers. Thus each academic discipline defines the extent of its domain and, having marked out limits, assumes that they circumscribe a whole that can be fruitfully studied. Continual refinements of methodology and the discovery of new phenomena within the field transform its terrain. Each discipline regulates itself by developing standards for judging and accepting or rejecting new methodology. Note that the definition we have just offered depends entirely on the internal construction of a field of study and does not question the implicit assumption of all academic disciplines — that the methods of study are appropriate to the objects or events to be studied.

The advantage of this model is that it allows us to posit “interdisciplinary” as a comparison of structures rather than an angle of vision or a juxtaposition of a material. If we define each discipline by the structure of its methodological rules, then the process of comparison creates a third structure, of which both the teacher and the student should be aware. We can create such new interdisciplinary structures in two ways. Either we apply the methodology of one discipline to the material of another, as when a philosopher brings his training to bear on a medical issue, or when a philosopher brings his training to bear on a medical issue, or we compare methodologies, such as the classics scholar’s search for etymologies and the anthropologist’s quest for archetypal folkways, so that the student sees not only the similarities between methods but also understands what part of experience each excludes.

Both of these strategies, the comparison and contrast of methodologies and the use of one discipline’s methods to address the matter of another field, characterize the University of Florida’s “Humanities Perspectives on the Professions” program, in which the authors teach. The participants in this venture design and present humanities courses that meet the particular needs of future
doctors, lawyers, engineers, and businessmen and hope thereby to acquaint these pre-professional students with humanistic methods and values that will apply to their professional concerns and enrich their personal lives. Each course in the program has its own interdisciplinary assumptions, but all share the aim of transcending the superficiality that simple interdisciplinary juxtaposition creates.

For instance one course, "Theatre and the Professions," examines a number of plays ranging from 17th-century to present-day works primarily as social documents embodying current attitudes toward the professions. This course goes beyond "additive" interdisciplinarity by presenting social and economic influences that at least partially explain shifts in dramatic form. Surveying plays from Molière's *The Miser* to Brecht's *Threepenny Opera*, the course winds the social maze from aristocratic criticism of a money economy through the 19th-century adoration of that economy to the *fin de siècle* bourgeoisie's unease with the values they have created and finally to the essentially left-wing position of more recent playwrights. The students come to learn something about the professions as well as about drama: from studying the three accounting scenes in Gay's *The Beggar's Opera* they appreciate accounting as the assignment of value, not just the numbering of things. They discern ethical judgments in what seemed to be an objective method.

**Iatrogenesis**

The problem of iatrogenesis which confronts humanistic biology might be avoided or lessened if we could predict the effects of new technologies when introduced into biocultural systems. For example, the lowering of infant mortality, and the reduction of deaths from infectious diseases worldwide, have brought in their wake the population crisis which threatens the survival of the species. Humanitarian motives have also spurred great progress in the correction of birth defects, so that the afflicted can lead relatively normal lives, and bear children of their own. The iatrogenic effect is a threat to the quality of the human gene pool. Other examples include the development of cancers and birth defects as a consequence of the growth of modern industry. We must learn to innovate with minimal biological disruption.

**Self and Society**

Many of the tensions dealt with in our humanistic biology courses are really problems of self versus society. Should individuals have the right to produce offspring which will be malformed, even though this presents a burden to society and to the offspring themselves? Should one have the right to smoke, in spite of evidence that cancer may result with its disruptive consequences for society? Does society have the right to employ behavior control measures in the name of the common good? A cherished Western value is the freedom of the individual to choose his own course of action. On the other hand, in most species individual interests are typically subservient to those of the group; to be otherwise would be disruptive of group survival. Science can help illuminate self-society conflicts, and may show how and why they have arisen.

**Halfway Technologies**

Sometimes science presents us with partial solutions that, by becoming
entrenched as palliatives, actually interfere with the needed progress toward prevention or cure. Kidney dialysis and coronary by-pass surgery are examples of such halfway technologies, for they absorb such vast resources that little money and energy are left to pursue the greater goal of complete solutions.

**Changing Ideas of Human Nature**

Science has provided us with certain capabilities for altering our own evolutionary future. It has also given us enough insight to foresee some of the risks of using those powers, as well as the risks of not using them. Refusal to act when action is possible constitutes a decision in itself. Increasingly, biotechnologies such as genetic screening, drugs, life support systems, organ replacement, altered mechanisms of reproduction, and possibly the laboratory creation of human life, all have placed god-like power into human hands. However, we cannot find in science alone the wisdom we need to evaluate all the alternatives. This dilemma is one of the most important and one of the hardest to solve of all the problems faced in our courses.

**Biological and Cultural Evolution**

Although the precise course of evolution is indeterminate, evolution has been marked by a gradual increase in the complexity of living things, regarding both structure and function. One result of this trend has been the emergence of extra-somatic or cultural evolution, a process derived from the older biological evolution, but with properties unlike those of its parent. The innovations of cultural evolution have changed and accumulated much more rapidly than has been the case for the organic structures created through biological evolution. One consequence of this unevenness in evolutionary rates is that certain biologically evolved attributes of human nature seem to become dysfunctional, even disruptive, when they are placed in cultural environments. Several examples are addressed in our courses. Assuming that biologically derived behavior patterns such as aggression, pair-bonding and territoriality do exist, they may be maladaptive for modern societies. Also, those biological drives which lead to excess number of offspring served as a vital component of natural selection in our early evolutionary history, but now may be anachronistic in a modern society which has the power to save lives, no matter how detrimental to the species.

**THE ROLE OF HUMANISTIC BIOLOGY IN THE UNIVERSITY**

Scientific knowledge and its application have thrust upon each of us the necessity of making informed choices, thereby greatly enlarging our sphere of moral responsibility. Biology majors as well as non-majors can qualify for their degrees without ever being exposed to the social, legal, moral, and ethical issues which modern biology has created. Abell speaks of the need for

... restructuring undergraduate biology programs to meet the needs of a society which is looking increasingly to the academic community "for the kinds of knowledge that translate into practical decisions on social, political, environmental and economic matters, for the kind of technical and professional training that translates into meaningful vocations in a biosocial context and for a kind of
scientific literacy that translates into a more involved and respon-
sible public."  

Humanistic biology courses can offer a valuable educational experience to all students and to concerned citizens in continuing education and extension programs. Though many colleges and universities have a course or two in this area, we believe this cluster of humanistic biology courses for undergraduate education is unique.

and


*Lawrence C. Besaw, James Goatley, Michael Kamrin, Robert McDaniel, and John Mullins, of the Natural Science Department of Michigan State University, have contributed much to the cluster of humanistic biology courses described in this paper, and to the ideas presented here. We wish to thank Dr. Marvin Solomon for having encouraged the formation of a humanistic biology group in our department.

Another English course, "The Artist as Diagnostician," attempts to demon-
strate that the disciplines of literature and medicine are complementary rather than antagonistic and that a mutually enriching interchange can exist between the two fields. Considering works from the English, American, and Continental canons, the course suggests that men of letters like Montaigne, Shakespeare, Dickens and Faulkner who pronounce on the health of society, diagnose spiritual malaise, attempt to quell intellectual epidemics, and pre-
scribe remedies for institutional plagues, use critical methods not unlike those
that men of science employ in their investigations. To complement this endeavor, the students pursue individual research projects that assess the literary careers of physicians who wrote, such men as Sir Thomas Browne, William Carlos Williams, Sir William Osler, and Anton Chekhov, and come to understand how medical training can influence an artist’s purview. This course, then, tries to undermine the “two cultures” frame of mind by showing that the pen does not preclude the scalpel, nor the scalp the pen. Literature and medicine encourage man to apply his mind in comparable ways to different tasks.

The problems of organizing and teaching courses in which the epistemologies and methods of one discipline are compared to another are twofold. First, one must find material accessible to both disciplines. Second, one must elucidate each methodology so that the student can participate in the comparison. One such course in our program is an introduction to legal studies, in which a professor of English, a professor of law, and undergraduates intending to go to law school examine legal philosophy, empirical case studies, and literary works. The texts from each discipline receive the sort of scrutiny that would conventionally apply in the other field. Thus an appropriate choice for the course is not *The Merchant of Venice*, which contains a trial scene, but *Waiting for Godot*, which dramatically raises the question “What is relevant evidence?” and invites application of legal reasoning. In like manner, an early session of the course involves the students subjecting a Florida Supreme Court decision that denied a black student admission to law school to the sort of close reading we associate with formalist literary criticism. Examining the rhetorical structures, choice of words, and style of the case, the class discerns the legal philosophy of the justices. This having been done, a discussion of pertinent social and historical information adds a supplementary perspective on the case. By the end of the session the efficacy of both literary and legal methods has been demonstrated. Either alone could not create what both together have produced.

One of the fortuitous spin-offs of this course is that the English professor involved now offers a class in which students inspect legal cases which evoke serious social and moral problems. For their final project in the course the students read and discuss *Oedipus Rex* using the terms that they have employed throughout the course.

A lecture presented in the “Engineering and Humanities” course illustrates another such means of comparison — considering the processes of creation in two disparate areas. In this talk, a professor of engineering design who writes poetry offers a functional comparison of artistic creation and engineering design. The lecture, itself a model of rigorous technical method, demonstrates that the artist and the engineer go through similar means of thinking in attaining their respective ends. Fashioning a sonnet and designing a bridge, then, seem to be homologous, similar in structure but different in purpose. The audience’s response to this insight proved interesting: the students, all prospective engineers, felt their professional image threatened and strongly resisted the idea that they could possibly think like artists.

The generation of this resistance seems to be one of the worst effects of compartmentalized education. Just as working Americans tend to define themselves by their jobs, so students define themselves by their majors. This early identification with a field and, increasingly, with career means that the student denies himself the excitement of discovering new ways of thinking. Surely the future doctor or engineer can better perceive his place in society by the study of
history and art, and the historian or artist who knows something of science and technology can more clearly understand the society in which he lives.

Thus the sort of interdisciplinary experience described above broadens one's understanding of the contexts from which various kinds of thought arise. Such broadening is of itself useful in that it helps the student to deal with uncertainty and to sort out issues. This understanding of the different modes of thought demanded by different disciplines seems crucial to the other demand present in the humanities — that they teach moral virtue. If the last half of the 19th century transferred its values from religion to art, the last half of the 20th century has placed its trust in the study of art and society rather than in art as a symbol of the society itself. More and more the teacher of the humanities finds that society itself is expected to defend moral values in a materialist age.

Some of us embrace this priestly function too fervently (pontification is a vice endemic to the teaching profession), while others take refuge in fastidiously relativism. In any case, teachers deal in materials that express moral values and as human beings hold beliefs and principles. How then can we steer between the sterile sort of technical teaching that refuses ever to commit a value judgment and the solipsistic sort of preaching that demeans the classroom as a community? How does one deal in materials that express moral values without commitment and the solipsistic sort of preaching that demeans the classroom as a community? How does one deal in materials that express moral values by commitment? We would suggest that the methods we have outlined in this essay point to a middle way. By stressing the academic disciplines are merely useful constructs, we can show how the intellectual edifices are built on assumptions about the world. By examining the connections among disciplines we can show that a relative world is not a world without values, but one in which basic values may be variously expressed in different situations. The comparisons of epistemologies ought to show that value judgment can take place outside an intellectual frame and that to understand any event we must place it into a context. In short, we aim not to inculcate a set of prescriptive rules but rather to suggest methods for trying on and testing values. Education is, as Martin Buber observes and Herbert Read reminds us, "the selection of a feasible world through a personality and for a personality" (Education Through Art, London, 1948, p. 292). As teachers we hope that interdisciplinary courses of the sorts described above will help future members of the professions, those students perhaps in most peril of donning the disciplinary blinders that narrow the world, to retain and even to cherish the wide view. Aware of the connections among disciplines, sensitive to the different ways that epistemologies confront a common problem, teachers can help students to understand how their own self-defined and self-regulated disciplines fit into the larger structure of knowledge that we call civilization. Thus educated, students can make more enlightened commitments to their fields, they will appreciate the alternatives. The professional niches that might otherwise have been refuges will become, for them, consciously chosen dwelling places.
REMEMBER

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