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An Interdisciplinary Model to Implement General Education

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by
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WHILE THERE IS LITTLE OPPOSITION to the concept that general education should be a major component in the higher education curriculum, there is no general agreement on the means to achieve the aims of general education. Although general education should enable students to deal with issues and problems from a broad, integrative perspective, as well as to know major forms of inquiry, institutions continue to teach students how to think solely within the confines of disciplines. Each college or department often develops strong programs in its disciplines, recruits majors, and, by implication, worries little about general education and a concern for integration. By default, general education curricula become a series of loosely related, if not unrelated, courses that emphasize specific disciplinary content. Students are left on their own to see connections, recognize commonalities, and evaluate disparities in methods, assumptions, and values. Despite the mounting evidence that not all students accomplish this task, students must still enroll in X number of courses in Area I, Y number of courses in Area 11, and so on.

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Curriculum designers are hard pressed to cite any theory of learning that advances certain disciplines as being necessary — in whatever proportion — to intellectual development. Most general education curricula appear to be formed more by political struggles among academic departments than by struggles among advocates of competing educational theories. This process may account for the relative sameness of the debates — and the curricula — year after year. The traditional discipline-based recipe continues as the dominant paradigm, even in the more recent of the so-called general education reforms.

The thrust of this article is to demonstrate the construction of a general education program with a different paradigm. We believe that general education should be more than a diverse knowledge base from which students leap forward to areas of specialization. In fact, we argue that the political approach to curriculum design ignores some very important aspects of cognitive development, one of which is the ability to integrate, or at least organize, the knowledge and skills of the different disciplines.

It is true that disciplinary specialization provides indispensable tools with which to assess relationships among highly selected variables within manageable sectors of knowledge. Without disciplines we would have trouble deciphering many of the causal links that provide us with important answers to specific problems in the humanities, sciences, and social sciences. However, specialized nomenclature becomes dysfunctional for comprehension of the interrelationships among the disciplines. This specialization threatens to erect a new Tower of Babel in which highly trained disciplinarians, using precise, newly coined definitions, may speak meaningfully only to those small groups who share their special language.

If we wish to pursue general education, we need to loosen, although not discard, the shackles of the disciplines. We must recognize that general education is intended to "liberate," that is, to develop a capacity for discovery and exploration of various modes of thinking, inquiring, and searching for patterns of meaning that are embedded in the disciplines. As problems are identified, we need to understand the limits of unidisciplinary thought and expand our horizons by a coordinated examination of alternative modes of description, conceptualization, and evaluation.

We believe that this need can be addressed by an integrative, interdisciplinary model of general education grounded in theories of learning associated with John Dewey, Jean Piaget, and William Perry. The model emphasizes what we call "generic skills," which include such cognitive functions as recognizing and defining problems; analyzing the structure of an argument; assessing the relationships of facts, assumptions, and conclusions; and per-

forming hypothetico-deductive processes.[1] These capacities can be seen as generic rather than discipline-specific (or even departmentally induced); we hold, therefore, that they furnish an appropriate basis for a model of general education.[2]

Theoretical Background

The model that follows was constructed by a social/educational psychologist, an economist, and a humanist, each with experience in teaching both discipline-based and interdisciplinary courses. Quite independently of each other, we had concluded that the discipline-based recipe for general education could be improved upon and that one key for doing so was the introduction of multiple perspectives upon specific issues in order to exercise, among other things, skills of comparison, contrast, analysis, and above all, synthesis. Upon discovering one another, it became clear that our common beliefs about learning/teaching had theoretical foundation in the works of Dewey, Piaget, and Perry. These three scholars converge in a number of ways, two of which are of particular significance for a model of general education: (1) each has asserted the importance of the reciprocal relationships between knowledge (cognition) and experience, and (2) each emphasized the epistemological significance of multiple perspectives.

Dewey addresses perspective management in a variety of ways; a notable example is his treatment of means/ends relationships (2, pp. 100-10; 13, p. 43). Piaget and Perry have articulated stage development theories in which the capacity to handle multiple perspectives is a factor differentiating stages of cognitive growth. Piaget has labeled this ability "cognitive decentering" (6, pp. 342-45; 15), while Perry refers to an analogous, although more abstract, ability as "relativistic thought," which includes the capacity to "think about thinking," (10, p. 205).[3]

To be specific, cognitive decentering is the intellectual capacity to move beyond a single center or focus (especially the innate tendencies toward egocentrism and ethnocentrism) and consider a variety of other perspectives in a coordinated way to perceive reality more accurately, process information more systematically, and solve problems more effectively. Piaget's classic beaker experiments (15) demonstrated the necessity of considering both the height and the width of beakers in order to estimate correctly the relative quantities of water each would hold. Each dimension is a "center" or focus of attention in the phenomenological field.

As problems become more complex or abstract than estimating quantities of water in beakers, the "centers" of attention may more reasonably be called perspectives, frames of reference, or even disciplines. The term decentering is still appropriate to denote the ability to shift deliberately among alternative perspectives or frames of reference and to bring them to bear upon each other or upon a problem at hand.[4] This construct may be seen as an analogue for the type of cognitive functioning that we assert as a major outcome of an appropriate liberal education. This type of functioning allows for the apprehension of connections between theories, disciplines, and schools of thought; between practical problems and accumulated knowledge; and between societal assumptions and cross-cultural variation. Above all, it enables individuals lo better assess the utility of the various disciplines for specific purposes and to acquire the habit of bringing scientific, humanistic, and social scientific perspectives to bear on complex problems. The importance of this process is evident in everyday decision making, as well as in scientific pursuits. For example, the cognitive functioning described above is essential in the search for solutions to such problems as energy depiction, environmental pollution, health care delivery, and urban decay, or in considering aesthetic qualities of line, color, form, and texture from the standpoint of music, art, dance, or theater.

The relationship between the simple concept of decentering and the foregoing assertions is elucidated by the work of William Perry. While Piaget's work was based primarily on the study of young children, Perry applied some of the same methods to the study of cognitive functioning in college students. The result was an extension of Piaget's theory into a form useful for understanding adult intellectual functioning. Specifically, Perry asserts that a stage developmental process is observable during late adolescence. According to Perry, students in their early college years exhibit "dualism," a form of thinking that is authoritarian, relatively passive, and basically one-dimensional in that it organizes information according to bipolar dimensions such as true versus false, right versus wrong, or black versus white. A subsequent stage of development is labeled "multiplicity" to indicate the tendency to see multiple truths, shades of gray, and phenomenological variations. In terms of the Piagetian model, multiplistic thinkers can accommodate many centers or perspectives, but they lack the cognitive structures necessary to organize them, bring them to bear upon one another, or evaluate their relative validity or utility. Hence, this stage is vulnerable to indiscriminate judgments, a conscious advocacy of what amounts to solipsism, and a tendency to ignore conflicting evidence. Correction of such errors becomes possible with the attainment of the next stage,

"relativism." In relativism, the individual has acquired the capacity to consider multiple perspectives relative to each other, and more importantly, relative to a set of higher order constructs — or what might, be called "metaperspectives" — which can provide bases for organizing alternative perspectives or assessing their worth for specific purposes. We shall return to consideration of this stage after attending to the final stage in the Perry scheme.

The most advanced stage of development according to Perry is "commitment" (or "commitment in relativism"), the distinguishing feature of which is the willingness to act upon a belief. This stage entails a readiness to tolerate paradox, take risks, embrace irony, and identify oneself with chosen notions, even when perfectly plausible alternatives exist and are acknowledged. Perry implies that commitment is the only way to escape being "at sea in relativism" (11, p. 94). Other scholars, especially those interested strictly in cognitive development, have suggested that Perry's description of relativism represents the highest stage in developmental transformations of cognition (7, pp. 12, 17, as interpreted in 11, p. 99; 8). The implication is that commitment in relativism, rather than representing further cognitive development, actually represents a characterological phenomenon that is informed by relativistic thought but does not necessitate any further cognitive restructuring. Indeed, commitment in and of itself is not uncharacteristic of dualists, solipsists, and even fanatics, suggesting that commitment may be independent of a stage of cognitive development. What is crucial is whether or not choices among multiple perspectives can be articulated and justified relative to metaperspectives, which clarify both the empirical and the value-based rationales for acting in a given way. It is at least arguably true that the stage Perry labels as relativism incorporates all of the cognitive machinery that is necessary for making such choices.[5] Therefore, the model that follows focuses on cognitive development, takes relativism as the desirable end, and does not attempt to explain how students move into commitment.

Returning therefore to relativism, an elementary graphic representation of this stage would place multiple perspectives along a horizontal axis and organizing structures along a vertical axis, and in grid-like fashion submit the perspectives to analysis in accordance with selected metaperspectives. Both horizontal and vertical dimensions, therefore, are taken into consideration relative to each other in complex thought. This calls for cognitive functioning analogous to Piaget's decentering, although at a much more complex level because it not only includes multiple perspectives, but also multiple organizing constructs.

The nature of the vertical organizing constructs, or metaperspectives, is difficult to specify in concrete terms because they can take a great variety of forms at a great many levels of abstraction. They include conceptions of relationships; frameworks that allow for categorizing on qualitative as well as quantitative dimensions; criteria against which to access the significance of objects or ideas; and constructs that create new unities out of disparate parts. The concept of metaperspectives can be illustrated through a simple analogy. If four pieces of fruit — an apple, an orange, a pear, and a peach — are placed on a table, specialists in each of those varieties may readily describe their differences. Their very existence as separate entities invites that discrimination, given the predilections of western thought toward specialization and analysis. If, however, those four entities are collected into a basket, our specialists must shift their perspectives to recognize that a new entity is created: a fruit basket. This is a higher order construction, synthesizing into one construct the common attributes of the four entities. The sheer existence of the basket creates order — or unity — out of four disparate yet related items. The fruit basket represents generalization and synthesis, processes that can and should be developed through general education.

While much work needs to be done to document the character and function of organizing constructs in complex adult thought, it is nonetheless possible to use the Dewey, Piaget, and Perry formulations in a model for general education. Accordingly, traditional academic disciplines may be seen as individual "perspectives" on a horizontal axis, each with its own base of knowledge and methodology. Along the vertical axis would be, among others, the metaperspectives by which principles, assumptions, or organizing structures in those disciplines can be extrapolated, reclassified, compared, and contrasted with each other. Thus, one "metaperspective" might serve to organize the types of methodologies used by the various disciplines; a second might classify the preferred level of analysis; a third might be the quantitative-qualitative gradation; and others might serve to organize any number of other transdisciplinary variables (see Fig. 1).

A general education model using this scheme would be concept based (or problem based) rather than discipline based. It would specify certain concepts or problems to be examined from multiple perspectives. The model is inherently interdisciplinary in that the assumptions and tools of various relevant disciplines will be utilized as different perspectives on the same concept or problem. The model is interactive, that is, it does not just call for a one-way flow of information into the minds of students; rather it insists that students act upon that information and construct ways of organizing it. This is essential in order to stimulate cognitive development.

This approach parallels Piaget (6, pp. 342-45), Perry (10), and Kitchener and King (8) who recognize that movement from one developmental stage into a more advanced stage is not simply a function of additional information. Rather, such movement involves new ways of organizing and processing information. As mentioned earlier, the mastery of relativistic thought, in Perry's terms, implies the use of metaperspectives — that is, the application of organizing schemes to existing or attainable information. The use of metaperspectives cannot be taught by delivering them as information. Rather, students must be encouraged to construct them. The leading method for enabling students to do so is to confront them with disparate or even incompatible elements of information; this causes the students to address the discrepancy. This process induces disequilibrium, an uncomfortable psychological condition that stimulates efforts to regain equilibrium. As often as not, and in accordance with Piaget's observations about disequilibrium, the most effective resolution is to invent a higher order construction, as in the fruit basket analogy. Acquiring the habit of responding in this way is a central characteristic of movement from one developmental stage to the next.

A considerable amount of attention has been given to the concept of sequentiality in stage development theories, not only by their proponents but

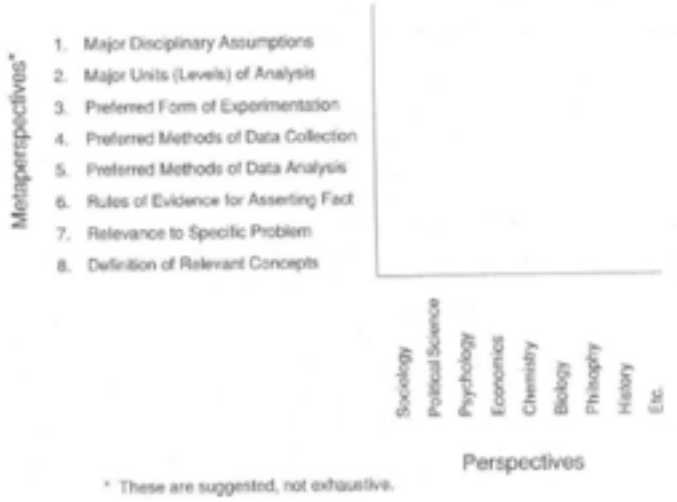

FIGURE 1. Sample of Relativistic Analysis Pertinent to Understanding the Disciplines.

also by their critics. The assumption most widely held by proponents is that development from one stage to the next can be stimulated only by causing individuals to engage in cognitive operations that are characteristic of the next most immediate stage of development. A rival hypothesis is that disequilibrium of any sort will prompt stage development. It is at least arguably true that Piaget held this latter view. If this latter view is correct, then the model described herein will be of utility regardless of the level of cognitive development brought by students to the course. The introduction of multiple perspectives is easily as instrumental in moving students from dualism to multiplicity as it is in moving students from multiplicity to relativism. Although the ultimate goal of the model is to aid the student's cognitive development toward reasoned action grounded in relativistic thought, movement from any stage to the next is certainly acceptable progress.

In what follows, we attempt to illustrate the application of this set of principles by expliciting a model that emphasizes the process of education and that can be used with various types of content or subject matter. For purposes of specificity, we have chosen social scientific material to illustrate the model; however, its applicability in the sciences and humanities is equally viable (9), and its true promise resides in its use in bridging the three major divisions of knowledge.

Interdisciplinary Model of General Education

This interdisciplinary model has several distinctive attributes: (1) it reflects a skills-oriented approach to teaching; (2) it may be applied to a wide range of topics; (3) it familiarizes students with methodologies from the social sciences and the humanities; and (4) it provides a mechanism that (a) permits students to reflect upon the material and their approaches to it and (b) underscores the fact that conclusions in the field of serious scholarship must be regarded as provisional, even though subsequent behavior may be influenced and directed by those conclusions.

The skills component of the model emphasizes generic skills, that is, those skills that support all forms of critical thinking, such as identifying the structure of arguments and identifying and utilizing assumptions that are critical to the reasoning process of posing and solving problems. These skills are emphasized because they transcend disciplinary boundaries. For instance, if we wish to examine the political process of electing a president, several disciplines including political science, history, sociology, psychology, and economics would be relevant. Since each of these disciplines utilizes specific tools, common analysis and interpretation may not be readily ap-

parent. If, however, we question ambiguity and search for alternative assumptions, we may discover, for example, that some economic forces and certain psychological motivations may actually be closely analogous and may figure similarly in influencing voter behavior.

In any given course the generic skills to be emphasized must be predetermined by the instructors according to their program and educational objectives.[6] The identification of a specific set of skills permits both students and faculty to focus on the importance of, and the methods of, integrating content from different disciplines. More specifically, the emphasis on generic skills requires the learners to question the solutions achieved by particular disciplinary approaches.

The emphasis on skills serves several functions: (1) development of problem-posing and problem-solving capacity; (2) acquisition of a sense of confidence that conclusions can be achieved or, at least, that intelligent questions can be raised; (3) mastery of the ability to apply and evaluate specific disciplinary methodologies; (4) development of a capacity to identify and evaluate different value patterns that influence the reasoning process; and (5) encouragement of learners to abstract and generalize from specific findings to a higher order of knowledge (conceptualization), perhaps even to the level of being able to organize several orders of concepts. The skills should also lead the learners to develop a habit of mind that is capable of dispassionate analysis.

At this point we believe a short digression is necessary to explain why we emphasize skill development so vigorously. Certainly we agree that knowledge acquisition is an essential component of cognitive development, but simply identifying the importance of knowledge begs the question about "what" knowledge is essential. The very movement toward greater specialization clearly indicates that few of us have the capability to comprehend the depth and breadth of even one discipline without considering whether we can comprehend the intricacies of multiple disciplines. This fact makes all of us very dependent upon "experts." Yet, if we permit ourselves and the "experts" to develop myopia as a result of increasing specialization, the "expert" conclusions may become increasingly one-dimensional and, therefore, increasingly divorced from reality. To protect against this potential, the general education thrust should be designed to equip learners with the ability to probe into the domain of the "experts" and identify fundamental assumptions and processes. The probing capability is enabled by the acquisition of generic skills. Consequently, it is the learning of skills and gaining of confidence in their utilization that will address the aims of general education and in the process foster greater cognitive development. It is high-

ly likely that with this model students will acquire a better appreciation of the changing nature of knowledge and the dynamics of observer interactivity with that which is observed.

To return to the specifics of the model, the content or knowledge component of this design provides the subject matter upon which the skills will be developed and practiced. This component should be inherently worth knowing and of relevance to at least two disciplines. In addition, the content should be chosen to permit the instructor and learners not only to understand the nature of the problem but also to appreciate how concepts from different disciplines can interact in the pursuit of problem resolution.

The content component differs from the skill component in that the content can be altered to fit the needs of the instructors, students, or institution, whereas once the program has identified the generic skills it wishes to address in general education, the development of these skills can be addressed with whatever content is actually chosen. The content, although inherently important, is primarily the vehicle with which the skills are taught.

Accordingly, the instructor must identify some concepts that are (1) salient in understanding the problem and (2) of interest to more than one discipline. Once defined, these "salient concepts" become the ideas around which the course content and skill development processes are organized. For instance, if we choose health care delivery systems as our content, we can identify "power" as one of our "salient concepts" and can examine such aspects as the economists' concern about the control of resources, the psychologists' interest in the effects of power on human behavior, the sociologists' interest in class-related power structures, and the political scientists' concern about government power.

Studying these "salient concepts" from multiple perspectives is an integral part of the process through which general education is accomplished. The mechanics of the integration will be achieved by explicitly defining each "salient concept" from the perspective of each discipline involved in the course. Through these definitions the instructors and students must come to grips with the disequilibrium that follows from the discrepancies between the disciplines. This coping process should flesh out the different value perspectives and concerns of the different disciplines and force the learning process into another stage of integration. For example, from an economics perspective the conflicting desires to maximize sellers' profits and minimize consumers' prices will force the providers of health care to make what economists consider to be proper allocative decisions. A sociologist may observe, however, that class distinctions prohibit some people from acquiring a fair share of health care. This sociological view may suggest that we con-

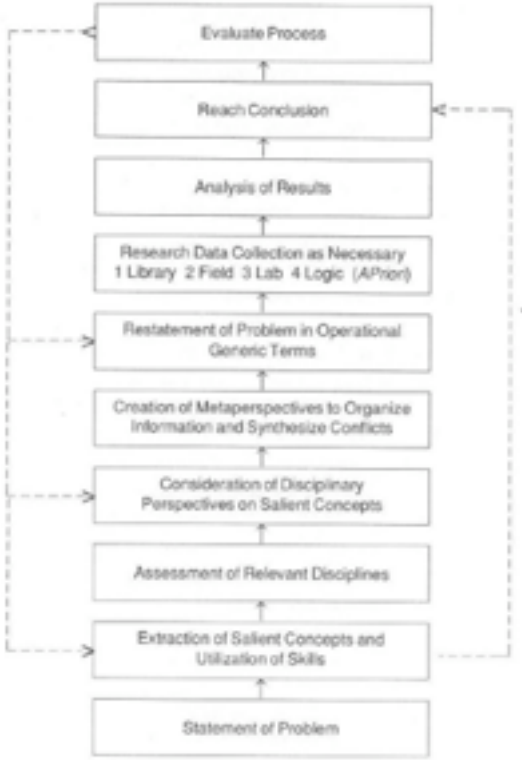

FIGURE 2. Process for Interdisciplinary Study of a Given Problem.

sider altering our health care delivery system from dominant private interests into some form of public or social medicine.

Admittedly the example is superficial, yet it suggests that by identifying some interdisciplinary "salient concepts" one is forced to deal with the assumptions and modes of reasoning present in the different disciplines. In some cases the approach of one discipline will support that of another, but in others the approaches may conflict or bear an orthogonal relationship to each other. In any case, however, delving into the different approaches to the "salient concepts" can only enrich one's understanding of a problem. Fur-

thermore, instances of conflict between the implications of disparate perspectives may be exceedingly useful in promoting the construction of metaperspectives (see Fig. 2). It is precisely this conflict that will induce the disequilibrium necessary to prompt cognitive development, a notion explicit in Piaget, implicit in the Perry scheme, and born out by research conducted by Petr (12), Althoff (1), Fuller (5), and others.

In this interdisciplinary model, the process by which the integration is achieved necessitates a two-level approach. The first level focuses upon the development and understanding of both the "salient concepts" and the skills that are to be utilized in evaluating these concepts. These tasks can be accomplished by exercising the generic skills in examining the "salient concepts." This allows the student to see the importance of both as tools for interacting with the problem. For example, although "power" is a concept relevant to virtually all the social sciences, each discipline has its own definitions. By contrasting the ambiguities and assumptions of those definitions, students can understand and practice the skill of clarification and build higher order constructions that accommodate the discrepancies. In other words, through this examination process the student will gather a list of definitions of "power" according to each discipline and can construct a composite understanding of "power" that is consistent with the disciplines under consideration. Care should be exercised to remember that these definitions are provisional and professors teaching at this level should focus primarily upon problem posing rather than certainty and conclusiveness. This recognition will accommodate students functioning at a lower stage of cognitive development.

The second level centers on a more thorough integration of the different perspectives identified by the definitions of the "salient concepts" as seen by the different disciplines involved. Since the first level has introduced the realization that the disciplines approach specific content from different perspectives, this level can attack statements, essays, and so on, written on the content (e.g., health care delivery) from each of the disciplines under study. Students will be confronted with some apparent contradictions and disagreements, which they must then attempt to resolve with the use of the skills developed in the first level. For instance, an economist may argue that private payment of health care will ensure quality because personal motivations to be "best" will result in more patients and profits for both doctors and hospitals. History, however, informs us that medicine has experienced significant degrees of governmental influence and regulation. Can we examine these two positions to determine whether legitimate reasons exist for the influence and regulation by government? Furthermore, can we integrate the

disciplines by examining health care systems with the "salient concepts" as seen through the perspective of one discipline while holding the definitions from the other disciplines constant? For example, if we assume that low income groups simply cannot afford adequate medical care or that medical research and development may produce some significant negative side effects, then some forms of regulation of medical care may be considered desirable. In both of these cases there is the question of whether the competitive mechanism of demand and supply is the best process by which to allocate medical care. In short, we may discover that medical care is a social good that is not properly allocated in a private, competitive market. If so, then maintaining medical care delivery in private hands may deny some people access to medical care and eventually influence the dislribution of power within the society. Confronting this prospect should, at the very least, stimulate a search for more creative solutions to the problem of equitable health care delivery. The process of searching, more than the process of finding, is exceedingly important in stimulating cognitive development in Piaget's observations about disequilibrium and in Dewey's conception of knowledge as a process.

By combining inputs from more than one discipline, students can challenge conclusions and eventually work toward a more comprehensive understanding of the problem at hand. If students achieve this level of sophistication, they have moved into the stage of relativism as described by Perry. Further, through manipulation of the different definitions and assumptions, students should eventually be able to reach a conclusion that moves them from blind acceptance of one particular point of view to a position of reasoned judgment that Perry associates with the stage he labels "commitment" (10, pp. 153-76) At this stage of the model we expect the students to articulate reasoned judgments that they, at least presently, are willing to defend against questions and concerns raised from the perspectives of at least one other discipline.

Throughout the model, the "process" of challenging must occur. As implied in the discussion of the model, the emphasis upon skills necessitates that students respond actively to the content under examination. Students should be required to subject every inference to examination with the generic skills and the rules of evidence espoused by the different disciplines. Once students show an inclination to make reasoned judgments, however, another level of challenge is essential to achieve the full integrative effect of the model; that is, when a conclusion is reached, it must be accepted as tentative. Upon acceptance of the tentative nature of one's conclusion, the instructor and students are ready to act upon, or at least willing to consider,

systematic reexamination of the conclusion, thus achieving the full meaning of reflective thought. More specifically, the reexamination process, depicted by the broken lines in Figure 2, raises the following questions.

1. Were the "salient concepts" the most important factors upon which to focus attention given the content (health care delivery) that was chosen?
2. Could our understanding of the issue be improved by changing or by adding concepts?
3. Have the most fundamental and salient assumptions been examined, that is, can we more clearly understand differences by ferreting out other value conflicts inherent in the issue?
4. Could the skills have been applied in a different manner, thereby influencing the nature of the original conclusion?

Through this reexamination process students are alerted to the importance of remaining open to new ideas and avenues of approach that are essential to understanding and appreciating inferences. Although the model thus far is aimed at helping students arrive at solid conclusions, the reexamination mechanism provides the warning device that can either identify some critical elements that were ignored in reaching the original conclusion or discover new information that forces reexamination of that conclusion. In essence the model describes a learning process that never completely achieves closure. Rather, the model emphasizes the importance and methods of searching for good, substantial conclusions, but admits that in a world that possesses a myriad of goals, any one conclusion is subject to change as new information is developed or as perspectives shift.

Clearly, one reason why legitimate alternative conclusions may exist is the existence of different value systems — different assumptions about what is important. Herein lies another aspect of the utility of this model for the humanities. Through reexamination, students must identify conflicting value systems and subject them to evaluation. By scrutinizing the potential positive and negative consequences of each set of assumptions, students may start to appreciate why reasonable people disagree. This process of scrutinizing should aid students' understanding that differing conclusions have varying kinds of consequences, and that we must reckon with these consequences prior to accepting or advocating a conclusion.

The resemblance of this model to the work of Dewey should now be evident. In his *Experience and Education* Dewey wrote:

> Anything which can be called a study, whether arithmetic, history, geography, or one of the natural sciences, must be derived from materials which at the outset fall within the scope of ordinary life-experiences . . . Finding material for learning is only the first step. The next step is the progressive development of what is already experienced into a fuller and richer and more organized form, a form that gradually approximates that in which subject-matter is presented to the skilled, mature person.... It thus becomes the office of the educator to select those things within the range of existing experience that have the promise and potentiality of presenting new problems which by stimulating new ways of observation and judgment will expand the area of further experience. (4, pp. 73-75)

Implementation of the Model

The interdisciplinary general education model could be implemented at the freshman-sophomore level prior to any serious pursuit of specialization by the students or it could be taught at a junior-senior level as a capstone type of course wherein the differences in the definitions of specific concepts will be readily apparent. The primary intent of the authors is to establish the utility of the first option for two reasons: (1) the generic skills are applicable throughout a college experience and thereafter, and (2) a solid interdisciplinary foundation hopefully will provide students not only with an understanding of how and why disciplines enhance subsequent study, but also with a defense mechanism against the myopia that may insinuate as a result of specialization.

If we wish to be heroic in our expectations, we advocate the use of the model in the freshman year because through experiencing a program designed around the model, students will be encouraged and trained to be better students. Through the emphasis upon skills and active learning, students will be equipped to ask their instructors more probing questions. In like manner, as the students probe for more complete insights into a problem, instructors may be motivated to rethink their approach to teaching. Instead of focusing primarily upon knowledge transfer, instructors may turn their attention to the higher levels of cognitive activity: analysis, synthesis, and evaluation. Of course, this prediction assumes that a substantial percentage of freshmen experience the interdisciplinary general education program.

Although we believe this model could be applied to a course that focused on one particular content area, such as health care delivery, the full implementation of the model to achieve the aims of general education and the highest levels of cognitive development implies a continuing commitment of at least one course per term for two or more years. Our reasons for advocating this time commitment can be easily summarized by indicating that the model includes discussion of at least two disciplines and an examination of issues from those disciplines with generic skills. Furthermore, the skills themselves must be learned sufficiently well so that they can become essential tools in evaluating the substantive arguments presented in defense of different positions. Finally as Perry observes (11, p. 89), transitions between stages may take more than a year.

Realistically, we expect that the implementation of one course per term is politically much easier than a major change in curriculum. Thus, if freshmen and sophomores were taught a course suggested by our model once per term, advancement to the higher cognitive levels could be continued by inserting elements of reinforcement into other courses in the curriculum.

Finally, we want to emphasize that the model will be a success only if students are required to engage in active participation. Students must constantly be required to think, challenge, infer, and synthesize disparate elements of information. The classroom should contain a healthy blend of Socratic techniques and explications. If the students are permitted to remain passive, they are likely to gain an awareness of the significance of the interdisciplinary model, but they will not gain the competence necessary to integrate the skills and the concepts. Piaget's concept of disequilibrium is indispensable, whether or not it runs contrary to an educator's genuine interest in making subject matter easily digestible.

This program is not one that assumes that learning is easy. The structure of this program will demand serious commitment from both faculty and students. The faculty must pursue faculty development whereby they learn about other disciplines and, more importantly, work with other faculty to articulate their respective disciplines. The "habit of mind" advocated throughout this discussion would influence not only the structure of a general education program, but also the approach that a faculty member may use in teaching a typical course in a discipline. Specifically, faculty must agree on content areas and "salient concepts." The faculty must also develop and agree upon the definitions of these "salient concepts" and how these definitions interact to suggest a conclusion that differs from one suggested by any one discipline. The students, meanwhile, must read, think, and write. Especially if we teach the program at the freshman level, the students must

read to gain familiarity with the content area; they must think to challenge the contrasting views they read; and finally, they must write to clarify their ideas and subject them to examination by the faculty.

In essence, we have proposed a model of interdisciplinary general education that we believe will enrich the faculty, students, and university. It is applicable in greater or lesser measure to all disciplines, but it moves the debate away from disciplinary sampling that results from departmental political struggles and toward a curriculum based upon how students learn. It need not preclude disciplinary sampling, nor argue against disciplinary majors. Rather, it may be incorporated as an augmentation of the general education program, and as such, approach in a new and promising way some of the goals traditionally presumed to inhere in the concept of a liberal arts education.

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Endnotes

1. In actuality, these generic skills are the scientific skills utilized by the disciplines, but stripped of their discipline-specific identity. For example, in assessing the relationships of facts, assumptions, and conclusions, we must understand how ambiguous language, alternative assumptions, fallacious reasoning, questionable use of data, and neglected perspectives may significantly alter the conclusion in a problem-solving effort.
2. We would also hold that what follows might be of significant value in the delivery of courses that are expressly "disciplinary," given that most disciplines embrace differing schools of thought, permitting a fertile framework for the exercising of generic skills.
3. The Perry conception is not strictly equivalent in meaning nor origin with Piaget's concept of "decentering," in that Perry's concept is rooted in Polanyi's notion of "personal knowledge," a concept more philosophical than empirical. Despite the difference in derivation, however, the two concepts bear a strong conceptual resemblance to each other, and many of their implications for instruction are the same.
4. This concept is similarly illustrated by Simmel's well-known analogy of the study of a painting. Different vantage points allow for different perceptions and different types of analysis, but it is essential to integrate them in order to achieve an elaborated understanding of the art work.
5. It is not clear that Perry would disagree with this assertion, since his interest in human development clearly involves questions that go beyond cognition itself.

6. Our experience suggests that it is not realistic to emphasize more than two or three generic skills in any one course. They may be selected from among those mentioned in this report or other pedagogical works, or identified through a priori logic.

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