for people to learn basic thinking skills--which, in turn are prerequisites for civilized cultural existence as we know it. If we want schools to do more than teach the "basics" of thinking, if, in addition, we want schools to teach critical, independent thinking, then we must question the ill-defined role of writing throughout the curriculum. Brazilian educator Paulo Friere contends that "liberating education" only occurs when people develop their critical reasoning skills, including self-knowledge and self-awareness. This ability to think critically separates the autonomous, independent people, who are capable of making free choices, from the passive receivers of information. In Friere's terms, liberating education consists of "acts of cognition, not transferrals in information" (1970, p. 67).

While it may be true that schools exist essentially to teach thinking, it is also true that many schools teach conformity and good manners and help justify the reigning political, social, and economic system. As a consequence liberating education, as Friere describes it, is dangerous in so far as it aims to teach individuals to think autonomously, independently, and critically. Could it be that the lack of expressive writing in the curriculum reflects a lack of interest in critical thought? Or, worse still, are teachers afraid to teach their students to be free?

The Britton research team entertained that possibility: "The small amount of speculative writing certainly suggests that, for whatever reason, curricular aims did not include the fostering of writing that reflects independent thinking; rather, attention was directed towards classificatory writing which reflects information in the form in which both teacher and textbook traditionally present it" (1975, p. 197). And my colleague, Randall Frisinger, gloomily insists that: "Excessive reliance on the transactional function of language may be substantially responsible for our students' inability to think critically and independently....Product-oriented, transactional language promotes closure" (Language Connections, 1982, p. 9).

But I don't believe that most of my colleagues want to promote "closure." I believe they truly want to teach students to be free, autonomous thinkers. They simply do not realize the role writing can play in effecting this. At the same time, however, when I ask teachers from different disciplines to identify the student writing problems which bother them most, a few mention spelling, punctuation, or grammar, while the majority talk about problems related to thinking ability: inability to focus, organize, write a thesis statement, develop a paragraph, use supporting evidence, cite references, etc. When Jack Meiland, of The University of Michigan, asked his colleagues the same question he reports similar answers: "The most frequent complaints were that students did not know how to develop their ideas and organize their ideas. They did not know how to formulate their ideas clearly, argue for their ideas, develop replies to possible objections, uncover hidden assumptions, discover the implications and consequences of a position, and so on" (fforum, Vol. IV, No. 1 (Fall, 1982), p. 23.).

In other words, most teachers recognize that a fundamental writing-thinking connection exists, yet they seldom examine exactly what that connection is, how it works, and how it might inform their pedagogical practice. Teachers like Meiland, who are aware of that connection may actually develop writing or thinking "skills" courses and so teach these basic skills directly, once and for all. Meiland, for example, created a specific, specialized course in critical thinking, where students were "taught intellectual skills directly and explicitly" (fforum, forthcoming). Meiland suggests that the best way to teach such skills is to teach "the associated forms of writing. For example, I teach skills of argumentation by teaching students to write argumentative papers" (fforum, p. 25).

A more common variation of this "thinking skills course," which will improve writ-

ing along the way, is the writing course which means to teach thinking along the way. One such course is offered by Peter Elbow, who teaches his students to freewrite, brainstorm, and keep journals in order to explore and develop their thought through personal, private language (*fforum*, forthcoming). A much different approach to accomplish a similar end would be that of Frank D'Angelo who teaches a highly structured writing course which emphasizes classical imitation. Here students first analyze, then imitate pieces of good writing to emulate "the best features of a writer's style." Such an exercise "mirrors the writer's cognitive processes, leading the student writer to a discovery of new effects" (*fforum*, forthcoming). Finally, we might look at the approach advocated by William Coles at the University of Pittsburgh, who argues in this issue of *fforum* that writing must be taught as an avenue to power. "To become alive to the implications of language-using is not, of course, to become free, but it is to have choices that one can not have without such an awareness" (p. 121). Coles' approach stresses the value of language-using for the writers--enabling them "to run orders through chaos, shape whatever worlds [they] live in, and as a consequence gain the identities [they] have" (p. 121). In other words, writing becomes synonomous with growing--the necessary precondition for autonomy and freedom. Many English composition courses attempt to do generally what Coles, Elbow, and D'Angelo suggest, teach both writing and reasoning skills in a single course.

But no matter how successful such skill-specific courses are, I believe the lessons they teach must be reinforced regularly, across the curriculum, in order to have a lasting, purposeful impact. Such courses work best with well-prepared, dedicated, motivated students who are willing to treat seriously what are obviously "practice exercises"--a term used by both Meiland and D'Angelo. Many other students, still groping for a foothold in the academic or social world simply may not be "ready" when such a course comes their way (or is required in their schedule). While good teachers such as Meiland, Elbow, D'Angelo, and Coles can help generate motivation where little existed before, these courses will not reach all students in all curricula.

A second approach, meant to have an impact on *all* students, asks students to learn writing and thinking skills in the context of their own career interests. Richard Ohmann writes: "People have concerns, needs, impulses to celebrate or condemn, to compact with others or to draw battle lines against them, to explain, appeal, exhort, justify, criticize. Such concerns, needs, and impulses are what lead people to write (and to speak), when they are not writing to measure" (1976, p. 153). Students assigned to write "exercise" prose on academic topics to teachers who will "measure" them often do so in prose which Ken Macrorie describes as "Engfish"--the stilted evasive prose common to school and bureaucratic writing alike. Much of the poor writing--and poor thinking--according to Macrorie stems from students who "spent too many hours in school mastering English and reading cues from teachers and textbook that suggested it is the official language of the school. In it the student cannot express truths that count for him" (1976, p. 4). Both Ohmann and Macrorie seek to develop intellectual skills within the context of the individual student's life and work. In other words, if we want writing (and thinking) skills to become useful, powerful tools among our students we must ask them to write (and think) in a context which demands some measure of *personal commitment*--which, in schools, is more likely in their major discipline than in specialized composition classes. Such assignments "nurture the individual voice" by asking that voice to engage through writing, with real, immediate issues (Fader, *fforum*, Vol. II, No. 2 (Winter, 1981), p. 53).

My colleague, Terry Kent, for example, teaches philosophy and requires his students to explore philosophical issues through expressive writing in their journals--Joan's journal entries (cited ear-

lier) came from Terry's class. Another example of a teacher using writing to promote--rather than test--learning can be found in Helen Isaacson, who teaches folklore at The University of Michigan; she asks her students to generate notes and drafts and speculations about local folklore "to become folklorists, to conduct original research in the field" (fforum, Vol. IV, No. 1 (Winter, 1982), p. 52). In other words, doing real research, and writing about it, has more meaning to most students than inventing a research project to practice writing research papers in English classes. Placing such instruction in a real--rather than imagined--quest for knowledge asks students to both reason and write well--skills they can learn by doing more easily than we can teach by telling.

We know, of course, that the whole school environment influences how students learn to read, write, and think about the world. While individual teachers and particular classes may be the most memorable and visible aspects of education, the more covert structure of the curriculum also "teaches." Schools which offer most of their instruction through large classes, lectures, rote drills, and multiple-choice examinations obviously do little to nurture each student's individual voice. Other schools which offer small classes, encourage student discussion, and assign frequent and serious compositions do nurture that voice.

Recently numerous institutions of higher learning have instituted "comprehensive writing programs" aimed at improving both writing and learning skills across the curriculum: at Yale and The University of Michigan, for example, such programs are controlled by boards composed of interdisciplinary faculty concerned with school-wide policies on writing; at Beaver College and Michigan Tech, faculty members attend "writing workshops" and learn to assign and evaluate writing more effectively in any academic discipline (The Forum for Liberal Education).

Secondary and elementary school programs have also begun more writing across the curriculum programs, influenced nationwide by the work of The National Writing Project and, more locally, by outreach efforts like The University of Michigan's English Composition Board--which, among other activities, distributes fforum free to interested teachers.

I mention these programs to emphasize a particular point: while the programs vary widely in size and scope, all assert that writing is a complex intellectual process central to both creative learning and proficient communication. They argue collectively that writing deserves serious re-consideration, increased attention and ever more thoughtful practice across the whole school curriculum.

The degree to which the curriculum promotes (demands?) comprehensive language activities on the part of students may be the degree to which it creates a genuinely liberating education. It is apparent to me that we need both pedagogical approaches described here: intensive writing/reasoning courses on the one hand and extensive reasoning/writing activities in all courses on the other. For this to happen, consistently, more teachers in all disciplines need to study the several dimensions of language which most actively promote clear writing and critical reasoning. With Lee Odell, I believe teachers might ask questions about their course requirements: Do we ask students to write and talk as much as read and listen? Does each assignment ask students to exercise a particular intellectual skill? (fforum, Vol. II, No. 2 (Winter, 1981) p. 57). With John Reiff and James Middleton, I hope teachers will view assignments as acts of communication between teachers and students and will question: "To what extent do students fail at writing assignments because we...fail to communicate our expectations effectively? Are there criteria we can use both to evaluate our assignments and to revise them for greater effectiveness?" (fforum, Vol. III, No. 1 (Fall, 1981), p. 34). With Don Murray, I believe that "the need to write in the

first place comes from the need to reveal, name, describe, order, and attempt to understand what is deepest and darkest in the human experience" (p.). Do our assignments reflect that need? Do they invite such investigations? Do they encourage such expressions? And do our responses to that writing show that we, too, care about the deep and the dark?

When we teachers ask these questions, we will not find quick and dirty formulas nor single, simple solutions. Learning to write, like learning to learn, defies prescription. But both writing and learning interlock when teachers ask students to create, contemplate, and act through language as well as drill, copy, and test. As James Moffett puts it, nicely: "Instead of using writing to test other subjects, we can elevate it to where it will *teach* other subjects, for in *making sense* the writer is *making knowledge*" (1982, p. 235). That writing makes sense and knowledge is unquestionable; the real question is, why don't we use it that way?

Metatheories of Rhetoric: Past Pipers

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In 1964, when Dudley Bailey published his essay, "A Plea for a Modern Set of Topoi," he cried to a discipline of English that had little interest in composition research and theory. Only a small minority of English scholars had begun to investigate the tacit assumptions underlying composition pedagogy and to develop alternative theories. But now, only two decades later, the situation has radically changed. Books and journals abound with theoretical and empirical research on composition; new graduate programs in rhetorical theory emerge each year. This richness of rhetoric within the province of English is nothing short of remarkable. But it may puzzle those who have recently entered the profession or who have suddenly become aware of this phenomenon. They may wonder how such interest awakened or why composition studies have taken the direction they have.

I have often asked myself these questions as I have looked back to the period in the sixties when I became interested in composition problems and discovered others so inclined. What drew us to research which was then so professionally unrewarded? The answer to that question is interwoven with the circuitous history of rhetoric itself and with the development of the discipline of English, a story already well-chronicled (Kitzhaber, 1953 and 1963; Applebee, 1974). This essay will not duplicate that history but will identify some major influences that I will label "metatheoretical" because they pointed out, directly or indirectly, what an adequate rhetorical or composition theory ought to include, ought to explain. These metatheories acted as pathfinders, as pipers whose voices drew composition theory down certain paths.

Although some of the earliest voices we heard came from different fields, a number of them merged to propose a conception of composition broader than of writing as the creation of a well-wrought urn. Wayne Booth called for his now-well-known rhetorical stance, a balance among the available arguments about a subject, the voice of the writer, and the interests and peculiarities of the audience (Booth, 1963). Such a conception was revolutionary in those days when textbooks rarely treated any aspect of situational context. Another spokesman for a broad conception of rhetoric was Kenneth Burke who envisioned a universe of language as symbolic action in which rhetoric functioned as an art of identification, "rooted in an essential function of language itself...the use of language as a symbolic means of inducing cooperation in beings that by nature respond to symbols" (Burke, 1969, p. 43). Burke deemed rhetoric essential for social cohesion, a broader and nobler view than the prevalent ones that considered rhetoric as verbal embroidery or as masked deception.

This more extensive conception of rhetoric was bolstered indirectly by the work of Kenneth Pike who argued that language could only be adequately understood in relation to a unified theory of the structure of human behavior (Pike, 1967). His idea of interlocking hierarchies influenced the development of tagmemic rhetoric which argued that intelligent syntactic or rhetorical choices could only be made in relation to larger contexts such as whole discourse, immediate rhetorical situation, and cultural contexts (Young, Becker, and Pike, 1970). During this period, Charles Morris' semiotics influenced the development of another theory of discourse by James Kinneavy (Morris, 1946; Kinneavy, 1971), a theory that extended composition beyond a preoccupation with exposition to other forms of writing. Moffett and Britton also

developed new classifications of discourse (Moffett, 1968; Britton, 1975) with similarities that Kinneavy has identified (Kinneavy, 1980). These reclassifications of discourse, stemming from semiotics, Piagetian psychology, or inductive research, not only challenged the reigning emphasis on expository writing, asserting the importance of expressive, persuasive, and literary discourse, but also argued against the pervasive confusion of aims and modes represented in the quartet--description, narration, exposition, and argumentation.

In harmony with these voices describing a broader province for rhetoric and composition, a number of scholars spoke of new epistemological ends. Booth advised a restoration of respect for probability, a sine qua non for meaningful writing in which good reasons support probable judgments. He explained that our modern culture's excessive reverence for facts and its relegation of everything else to mere opinion had created a climate inimical to teaching writing (Booth, 1974). A more radical treatment of probability was being developed at this time by Michael Polanyi who challenged the bastion of certainty itself, the sciences. Polanyi rejected the objectivist ideal of knowledge that insisted on complete exactitude, objectivity, and explicitness, advocating instead a passionate active commitment that involved risk and required choices, that led to judgments informed by grounds less compelling, judgments arrived at cooperatively by the enquirer and his accredited audience (Polanyi, 1962). Sam Watson would later characterize Polanyi's work as inherently rhetorical (Watson, 1981). During this same period, scholars like Scott, McKeon, and Perelman began to describe rhetoric as epistemic, arguing that the act of acquiring knowledge was a rhetorical process of intersubjective choice-making and symbol-using (Scott, 1967; McKeon, 1971; Perelman and Olbrechts-Tyteca, 1969). These voices blended to draw composition theorists toward the view of writing as essentially an investigative process, a tool for inquiry, rather than as merely an act of reporting, of providing supportive facts for preconceived judgments. This conception also turned attention to the need for arts of inquiry, for accounts of how good writers discover, support, and communicate probable judgments and new understandings (Emig, 1970).

This view of writing as a way of learning and discovery was supported by an emerging interest in invention. Harrington reminded the profession that rhetoric had always lost life and respect to the degree that invention had not had a significant and meaningful role (Harrington, 1962).

Bailey urged the development of new sets of topoi. Studies of creativity and problem solving stimulated interest in the genesis of creativity, in the processes of discovery, and especially in the role of heuristics as aids to effective inquiry. Torrence and Guilford studied the abilities operative in learning and creating. Wallas, Newell, Simon, and Shaw examined the stages and processes of inquiry and problem solving (Lauer, 1967 and 1970). Lonergan analyzed the movement toward insight, speaking of its genesis as the "known unknown" (Lonergan, 1957). Parnes and Gordon experimented with methods of enhancing creativity (Parnes, 1967; Gordon, 1961). These studies contributed to the development of new exploratory models for writers and eventually to revised notions about the genesis of composing as well as about pedagogies for teaching the composing process. More specifically influential on new theories of invention were Pike's

tagmemic model and Burke's Pentad which composition theorists and textbook writers adapted to create new sets of topoi. These new exploratory guides as well as the entire emphasis upon invention that began in the sixties developed, therefore, in large measure in response to a variety of multidisciplinary voices that not only called for a reinstatement of invention but also investigated the nature of inquiry, offering a basis for new sets of topoi.

Another path opened in the sixties led to a view of writing as a collaborative activity. Philosophers advocated that rhetoric be viewed as a situation of risk in which both writer and reader change, rather than as a one-way exercise of control or manipulation of a reader (Natanson and Johnston, 1965). Kenneth Burke saw the goal of rhetoric as a consubstantiality and identification achieved through a dialectical process of naming (Burke, 1969 and 1962). Polanyi insisted on the importance of the community in the tacit component of inquiry and its necessity for original advances in knowledge (Polanyi, 1958). Carl Rogers, posited threat reduction as a basis for successful communication (Rogers, 1961). All of these interactive views of rhetoric began to assail the prevailing conception of writing as the creation of a product whose inherent meaning was unaffected by readers. Although deconstructionists would later refine this view, composition theorists had already begun to work in the sixties with a collaborative conception of writing.

A final influence I want to mention here was the work of Walter Ong whose studies of literacy exercised a more subtle influence on the development of composition theory and pedagogy (Ong, 1967, 1968, 1971). Those who listened to him began to realize that any adequate theory must reckon with such complex cultural influences as changing technologies, shifting conceptions of education, and primary and secondary orality.

Composition research that began in the sixties, therefore, harkened to a variety of voices that suggested new ways of viewing writing theory and pedagogy. These pipers led to a reconception of the province of composition as more extensive than exposition or persuasion, as more meaningful and complex than isolated treatments of words, sentences, and paragraphs. They stimulated a view of writing as a process of inquiry, as a way of learning, capable of being facilitated by arts of invention. They opened up a perspective of writing as an interactive search for meaning rather than as the delivery of preconceived judgments, as the conquest of an audience, or as the creation of a well-wrought urn. They fostered the development of the inventional arts of beginning and exploring. And finally they prompted the investigation of multiple influences on the development and enhancement of literacy. Some of these paths brought theorists to forks in the road from which they took new directions; but many paths still offer important avenues for investigation. What remains characteristic of composition theory and pedagogy is its continued openness to multidisciplinary studies as a source of leads in its investigation of the complex human activity of writing.

Rhetoric and the Teaching of Writing

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In Plato's Gorgias, Socrates takes the rhetorician sternly to task for having mastered, not a true art like medicine or politics, which is grounded in learning and moral commitment, but a mere "knack," like food preparation or personal adornment, where flattering appearances are valued over substance (465A). The rhetorician, he claims, deals only with strategies of persuasion, and with the prescribed formulas of suasory discourse, regardless of the content of a given argument or the justification for seeking to persuade in the first place. Neither learning nor moral commitment is essential to the rhetor as such, but only a technical virtuosity in composing. Potentially, then, the rhetorician is little better than a charlatan, seeming, for example, more knowledgeable about medicine than the doctor, merely by sounding more convincing. For the orator, Socrates asserts, "there is no need to know the truth of the actual matters, but one merely needs to have discovered some device of persuasion which will make one appear to those who do not know to know better than those who know" (459C).

For centuries rhetoricians have struggled to defend themselves from Plato's attacks by arguing, with Aristotle, that an orator must also be a philosopher, literally a lover of wisdom, and by insisting, with Quintilian, that the good orator must first be a good person who joins learning with ethical awareness in the service of responsible conduct. But always these defenses have had about them the odor of rationalized self-interest--like the NRA's insistence that guns don't kill people ("only people kill people"). It isn't rhetoric that deceives, but only the evil orator.... Maybe so, but still, we think, an instrument that begs so conspicuously to be abused is hardly well defended on the basis of its ostensible moral neutrality. Plato's arguments do not disappear so easily: indeed, they have proven resilient for more than 2000 years. In my opinion, they are unanswerable as long as we are willing to accept their basis, Plato's assumptions about the nature of rhetoric: that it defines nothing more than a set of optional communicative vehicles for ideas that are somehow preconceived; that it offers a collection of empty forms available to good and evil alike for conveying truths--or errors or falsehoods--to a variety of audiences on a variety of (ceremonial) occasions.

Herein lies a problem for contemporary writing teachers. It seems to me that we often do accept Plato's views about the difference between knowledge and articulation, intellectual "content" and verbal "form." And having granted his assumptions, we are vulnerable to his charges. When we speak these days of "the rhetorical approach" to teaching writing, we typically mean a concern for modes and forms of discourse: description, narration, exposition; five-paragraph themes, comparison/contrast essays, topic-sentence paragraphs; plain versus elevated, or correct versus incorrect style. A so-called "rhetoric" textbook talks about these forms, labelling and taxonomizing them as though they really existed out there in Plato's Ideal Space, as though writers selected them in advance from some inventory that the rhetorician is responsible for stocking. A "rhetoric reader" offers presumably typical samples of these modes and forms, though with a revealing cautionary note that--awkwardly--the models seldom demonstrate a single option but instead merge several in peculiar hybrids. Teachers who use "the rhetorical approach" tend to be-

lieve, whether they say it out loud or not, that what students write matters less than how they write it, that learning to manipulate public and professional formulas (the term paper, the business letter) is more important than thinking well in language or discovering personal stances and values, that technical decorum is the focus of a writing course, not the intellectual and moral growth of writers. In "the rhetorical approach" writing tends to be conventionalized and ceremonial, like the famous abortion essay, where the pros and cons have been rehearsed until the subject is now conveniently moribund so that the advantages of comparing-and-contrasting can shine forth without the troubling interference of a live, recalcitrant human issue.

As long as we writing teachers accept Plato's divorce of knowledge from articulation, or teach as though we accepted it, I say Plato was right to call us an unscrupulous lot, engaged in low, dishonest business. How can we at once concede his premises and escape his conclusions? Teaching by "the rhetorical approach" we often demonstrate to our more sophisticated students the trivial, ritualistic nature of classroom writing. We watch them, bored but tolerant, suppressing their intelligence in order to jump through our hoops. Fortunately, that intelligence enables them to survive us and learn to value their writing--as soon as they find readers who also value it. At the same time, though, we also offer weaker minds an art of dissembling, the knack of saying nothing or of recapitulating a party line in polite, decorous prose. The moral lesson for these students is that playing the game and withholding commitment will take you far. Strategic timidity can be worth at least B-. Finally, in the worst cases, usually involving unpracticed writers, we retard the capacity to write while simultaneously extinguishing the desire to try. That is, we make writing superficially difficult by asking students to do it _this_ way instead of that while also making it irrelevant through our insistence on following the rules first and saying something meaningful only afterwards (if at all). To the extent that we can all recollect these cases, Plato was surely right: our preoccupation with formal propriety can do as much harm as good, and we might be well advised to find a more respectable line of work. Better, perhaps, to do away with writing courses and emphasize composing in the disciplines, where at least it might go on in the context of directed intellectual dialogue and in the interest of new learning. One can find some motivation in history writing or psychology writing, but what is the earthly good of comparison/contrast writing?

Having said all this, however, I am no less enthusiastic about the importance of rhetoric and the value of teaching writing, even in writing courses. What sustains me is not some ingenious answer to Plato's objections (I can't think of any), but rather my unwillingness to accept his assumptions about rhetoric, especially his sense of its restricted role in learning and communicating. Let me offer some alternative assumptions, closer to a modern philosophic temper. As I see it, rhetoric is not brought optionally to the service of some subject, medicine, or law, or history, as an all-purpose, hand-me-down system of forms for anyone's content. Rather, any subject is the very thing it is by virtue of the peculiar cast of its rhetoric: hence, we may speak of the rhetoric of law or the rhetoric of history, meaning those particular language-acts which define a discipline by representing an epistemological as well as methodological context for its practitioners. Apart from discourse, there is no "history"; and apart from rhetoric there is no historical discourse. If we view rhetoric as an art, a practice, a way of doing something, it is the process of using language to organize our experience and communicate it to others. If we view it as a science, in the classical sense, a field of study, its concern is with the multiple ways in which language makes experience intelligible and communicable. As a science, I would locate it in semiotics, the study of how any sign or sign-system organizes experience. And I would locate within rhetoric the study of speech (oral dis-

course), "composition" (in the sense of written discourse), and poetics, the study of discourses claiming distinctive cultural value. From this vantage point, rhetoric is clearly not an "approach" to teaching writing at all: it is, instead, a context for that teaching, a set of attitudes, assumptions, and concepts which together make the teaching of writing a coherent activity. "Techniques" for composition instruction may differ from those useful in teaching oral argument, but a "rhetorical approach" cannot be distinguished from some presumed alternative: rhetoric is generic; composition is specific.

The definitions I have offered evidently alter the classical view of rhetoric. In particular, they acknowledge a much closer connection between knowing and articulating. We use discourse to organize experience--and "ordered experience" is another name for knowledge. Acts of language have heuristic value, as numerous contemporary linguists and composition theorists have argued. Discourse makes knowledge, rather than merely dressing it up for public display. The process of making connections which lies at the heart of learning lies also at the heart of composing, so that verbal composition is a mode of learning, a manifestation of the process of discovering coherence. Discourse also communicates, to be sure, but communicating is neither more nor less important than learning: indeed, the two motives interanimate, to use I. A. Richards' term. In writing we learn about things through the effort to make communicative sense out of them; and we communicate by making the track of our learning visible and in some way meaningful to readers. The harder we work to learn, the richer our communication; the harder we work to communicate, the richer our learning. Given this modern view, Plato's belief that knowledge somehow exists independently of articulation, and the subsequent differentiation of learning from the forms of discourse, is erroneous and unproductive. The process of writing makes form: we do not start from a perception of some formal absolute, filling in a structural shell as we would pour the ingredients of a pie into its prefabricated crust. The mental effort to make assertions and to connect them as a coherent pattern over time causes form to emerge gradually, unpredictably, contingently, the ultimate achievement of an effort to make meaning in a temporally linear medium. The modern rhetorician's concern, and it should be the writing teacher's concern as well, is not to taxonomize formulas for discourse, but to study and to nurture the capacities by which we make coherence out of the chaos of experience, a coherence which verbal action distinctively enables us to shape.

I would point out in passing that these views are not original to the twentieth century. The revolution in rhetorical theory that they represent has been in progress for some 350 years, since Descartes and Locke challenged the ancient supposition that language was merely the dress of thought. Writing teachers can profit from studying the history of rhetoric in order to discover a more reliable and productive underpinning for their instruction than that offered by Plato and the classical, formalist tradition. But a more important point for now is that, if Plato's theory of discourse is limited, then contemporary teaching based on it is similarly limited. At the same time, since we are slowly elaborating a richer theory, we need not accept ancient assumptions, nor need we suffer the abuse that Socrates directed at Gorgias. Consider an alternative frame of reference for the writing class. I would say that a teacher who accepts the context of modern rhetoric first of all values writers over writing, the unending search for new meaning over the artifacts that are its residue. Texts are not monoliths, incapable of change or growth, but only moments in a lifelong learning experience, a succession of inherently unstable coherences, freely altered and abandoned with the evolution of insight. The teacher is less concerned, then, with formal or technical evaluation, as though **The Text** were primary, than with the quality of a writer's understanding, his or her developing capacity to make statements that matter. The point of writing is to learn by taking imaginative risks;

it is to make, test, and reformulate coherences, not to master rubrics for the ceremonial display of trivial thinking. The teacher-reader's role in nurturing writers is to problematize their premature conclusions about their experience through facilitative responses aimed at stimulating more writing, not labelling errors or insisting on the reader's personal notion of an **Ideal Text.** The writer strives repeatedly to create order from chaos; the reader monitors the striving through dialogue about the meaningfulness of the (always) emerging discourse. Learning and communicating go on in the context of shared intellectual inquiry, just as they go on in the world we are supposed to be preparing our students to inhabit as thoughtful and responsible human beings.

Can there be a more profoundly ethical activity than the striving to make new meaning through discourse? The matured ability to order experience enables moral choice and responsible action, so that our teaching of writing, which aims at this matured ordering capacity, is intimately connected to the growth of ethical awareness. To view writing as thinking and not just an exercise in formal display is to refute Plato's argument about the superficiality, the ethical indifference of rhetoric. It also sensitizes us to our preeminent obligation of making students accountable for what they think and say. There is no true literacy, I suggest, apart from judgment and moral commitment: And the only way to encourage that literacy is to take students' meanings seriously. The writing class is well suited to engaged intellectual inquiry because it need not follow the teacher-based agenda of a "content" course given to introducing a particular subject in a predetermined way. We can allow students to examine their experience, their values and commitments, through reading and writing in directions they find personally significant. The consequence need not be diffuseness or relaxation of academic rigor; on the contrary, it should be an intensified awareness, a deeper penetration of issues arising from the freedom to dwell at length on substantial human questions and to experiment with stances toward them in the presence of a discerning reader. This seems to me our strongest argument for the role of a writing course in the liberal arts curriculum. Importantly, it is an argument based on our recognition that rhetoric is not a "knack" as Plato thought but a fundamental manifesting of the capability for symbolic action that defines our humanity.

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Science Writing and Literacy

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One of the most important developments in education in the last decade--perhaps the most important--has been the enormous growth in the cultural and ethnic diversity of the student body and, indeed, of the programs offered in schools. This growth, accompanied by decreased homogeneity in all student groups, has been reflected in the broader base upon which many of the subjects, particularly those of an anthropological and cultural nature, have been considered. As might be expected, the concept of literacy itself has been broadened; but in most classes where reading and writing are taught, it has not been broadened to include science and its literature as part of the definition. It is not, perhaps, surprising that this should have happened since, traditionally, teaching functional literacy has been regarded as the province of the teachers of English and of English literature, and knowledge of science and its literature has not been one of their high priorities. If, however, students are to become fully literate, they must become familiar with the literature of science as well as the imaginative prose and poetry traditionally taught as literature. English teachers who want to help their students become literate today can and should introduce them to the literature of science.

As Jay Robinson suggests elsewhere in this issue of <u>fforum</u>, teaching imaginative literature exclusively is different from teaching literacy. Since literacy implies a capacity to understand ethics and culture in their broadest sense, the teaching of literacy requires the teaching of a plurality of literatures. Interestingly enough, this plurality was once encompassed by the word <u>literature</u> in its singular form, and it included writings in all areas of what are now classified as the humanities and sciences. Today, as the 21st century approaches, and as an understanding of scientific thought becomes increasingly important, English teachers who teach literatures have it in their power to lead students to a broadened appreciation of human experience in which the sciences and the humanities are reunited. We urge English teachers to begin the process of reintegrating the two traditions by including selections from the literature of science in their curricula.

Our purposes are to call attention to the neglected area of science literature and also, through examples which are not only good science but excellent writing, to begin to introduce non-scientists to the ideas and procedures of science itself. We believe the second objective is just as important as the first, and that it provides a way into modern science for those who have felt intimidated by its apparently formidable structures and technology. A large part of the intimidation has arisen from confusion in the public mind of what are, in fact, two distinct kinds of writings within the literature of science. We call them <u>scientific writing</u> and <u>science writing</u>, and they are clearly distinguished by the purposes, uses of language and different audiences for which they are intended. <u>Scientific writing</u>, the writing which appears in scientific journals, is written by scientists for an audience of peers to acquaint them with advances in their fields, and it bristles with the formalisms and abstract symbolisms on which the progress of many sciences depends. <u>Science writing</u>, on the other hand, appears in widely available books and essays and is written by scientists

for general audiences to make the concepts and methods of diverse areas of science accessible in everyday language. It is not scientific writing but science writing that can, and should, be included in English curricula.

There are, of course, important differences between science writing and imaginative literature. Perhaps the most important difference lies in the kinds of human experiences they treat. In an aesthetically pleasing essay which introduces readers to science, Aldous Huxley explores this difference:

> All our experiences are strictly private; but some experiences are less private than others. They are less private in the sense that, under similar conditions, most normal people will have similar experiences and, having had them, can be relied upon to interpret the spoken or written reports of such experiences in much the same way.
>
> About the more private of our experiences no such statements can be made. For example, the visual, auditory and olfactory experiences of a group of people watching the burning of a house are likely to be similar. Similar, too, are the intellectual experiences of those members of the group who make the effort to think logically about the causes of this particular fire and, in the light of current knowledge, of combustion in general. In other words, sense impressions and the processes of rational thought are experiences whose privacy is not too extreme to make them unsharable. But now let us consider the emotional experiences of our fire watchers. One member of the group may feel sexual excitement, another aesthetic pleasure, another horror and yet others human sympathy or inhuman and malicious glee. Such experiences, it is obvious, are radically unlike one another. In this sense they are more private than sense experiences and the intellectual experiences of logical thought.
>
> In the present context, science may be defined as a device for investigating, ordering and communicating the more public of human experiences. Less systematically, literature also deals with such public experiences. Its main concern, however, is with man's more private experiences, and with the interactions between the private worlds of sentient, self-conscious individuals and the public universes of "objective reality," logic, social conventions and the accumulated information currently available (pp. 4-5).

This passage immediately distinguishes for us in clear, beautifully structured prose, those things we might legitimately call science from those we might define in other terms, the most private of which we sometimes express in poetry. Aldous Huxley was a man of letters with the ideal scientific background to appreciate the private as well as the public experiences and to write about them with equal fervor and conviction. The quotation is the second of thirty-eight contributions in a small volume entitled Literature and Science, and Huxley's analytical treatment of the subject is scientific, perceptive and literate.

Recognizing that science and imaginative literature are grounded in different domains of experience, we must learn to understand and appreciate both. Studying science writing can facilitate the process for, as scientists have continued to publish books and essays for the public, the vast area of human experiences explored by science has become increasingly accessible to people whose primary interests are literary. As we all know, the realm of experience which imaginative literature treats, the realm of private experiences, is largely concerned with human interactions. In most of this literature, the environment, both animate and inanimate, if not simply taken for granted, either reflects those interactions in some way or is used as a backdrop for occasional sensual or colorful description. In the real world, there is no doubt that human relationships are

powerful determinants of both our courses of actions and our life styles, but the environment which surrounds and impinges on those relationships has a major effect on our behavior, our values, and our aesthetics. To be truly literate, we and our students must have total access, through reading and writing, to the physical and biological environments as well as the human relationships that shape our culture, our ethics, and the quality of our lives.

One of the problems faced by non-scientists who wish to extend their understanding of ethics and culture is where to begin, how to find a bridge from imaginative literature into science. The best science writing offers that bridge, since it shares much with imaginative literature. Teachers and students who read and enjoy imaginative literature can also read and enjoy science writing. Many of us have long marveled and often been exhilarated at the sense of beauty invoked by majestic phenomena such as waterfalls, mountains, clouds, sunrises and sunsets; this sense of marvel and exhilaration is deeply embedded in our cultural heritage and our imaginative literature. The intricate constructs of nuclear physics, chemistry or molecular biology, not perceivable to the naked eye, have the same capacity to thrill and to awe those who seek to "see" them.

Just as Huxley's elegant discussion of science and literature offers an introduction to the domain of science, so other science writings provide non-scientists with clearly-written, substantive expositions of the way science works. In the following piece, for example, from Science and Society--a collection of essays by authors as well known as Jacob Bronowski, James B. Conant, Erwin C. Schrodinger, Michael Polanyi and John Z. Young--Norman Campbell offers a strikingly lucid discussion of theories and laws in science. Campbell's essay, "The Explanation of Laws," speaks even more specifically than Huxley's to the distinctions between science and non-science and does so in a way which makes us feel the presence not only of a powerful intellect but also of a humane scientist:

> Explanation in general is the expression of an assertion in a more acceptable and satisfactory form. Thus if somebody speaks to us in a language we do not understand, either a foreign language or the technical language of some study or craft with which we are not familiar, we may ask him to explain his statement. And we shall receive the explanation for which we ask if he merely alters the form of his statement, so as to express it in terms with which we are familiar. The statement in its new form is more acceptable and more satisfactory, because now it evokes a definite response in our minds which we describe by saying that we understand the statement. Again we sometimes ask a man to explain his conduct; when we make such a demand we are ignorant, or pretending to be ignorant, of the motives which inspired his action. We shall feel that he has offered a complete explanation if he can show that his motives are such as habitually inspire our own actions, or, in other words, that his motives are familar to us (p. 41).

From this brief introduction, Campbell, a physicist, develops for non-scientists what is probably one of the clearest and most literate statements about theories and laws ever written. In only a few pages, he condenses for those who wish to read and seek new experiences what might have been expected to fill at least a volume devoted to critical thinking and symbolic logic. The ideas as well as the clarity and the economy of the language lure the reader to read on and on, further and further into what is normally regarded as an abstruse and academic topic, with understanding and pleasure.

Since science writing, like imaginative literature, is an attempt to make sense of human experience, it is not surprising that some of the familiar themes of great literature also run through science writ-

ing. These themes provide a context which helps non-scientists integrate unfamiliar ideas into familiar ones. The concept of "oneness," for example, of the interrelatedness of everything, a pervasive theme in imaginative literature, is also evident in science writing. The idea of relativity as developed by Einstein is an expression of this theme in terms of scientific events and metaphors. This theme recurs in the writing of many other scientists as well. It is, in fact, the thread that binds together the twenty-nine essays of Lewis Thomas' The Lives of a Cell. In these essays, Thomas, a biologist, draws on many of the familiar devices of imaginative literature while he explores and makes sense of the unfamiliar, as the introduction to the title piece shows:

> We are told that the trouble with Modern Man is that he has been trying to detach himself from nature. He sits in the topmost tiers of polymer, glass, and steel, dangling his pulsing legs, surveying at a distance the writhing life of the planet. In this scenario, Man comes on as a stupendous lethal force, and the earth is pictured as something delicate, like rising bubbles at the surface of a country pond, or flights of fragile birds.
>
> But it is illusion to think that there is anything fragile about the life of the earth; surely this is the toughest membrane imaginable in the universe, opaque to probability, impermeable to death. We are the delicate part, transient and vulnerable as cilia. Nor is it a new thing for man to invent an existence that he imagines to be above the rest of life; this has been his most consistent intellectual exertion down the millennia. As illusion, it has never worked out to his satisfaction in the past, any more than it does today. Man is embedded in nature (p. 3).

In this essay, Thomas expresses, almost as a conclusion to an argument not presented, the affirmation of the "oneness" of man and nature, an affirmation which seems to have almost the same ring and the same conviction as Beethoven's 9th Symphony. Through a myriad of unifying metaphors, Thomas makes significant scientific and social statements which encapsulate much of what we regard as important in the contemporary world; and these statements seem less didactic than beguiling because of the graciousness of their form.

As Thomas' essay suggests, much of the world of science is as metaphorical as the world of imaginative literature and, by necessity, writers must use the same language to express the great truths of both the public and the private domains. All of this is summed up very succinctly by Aldous Huxley in the final essay of Literature and Science:

> Words are few and can only be arranged in certain conventionally fixed ways; the counterpoint of unique events is infinitely wide and their succession indefinitely long. That the purified language of science, or even the richer purified language of literature should ever be adequate to the givenness of the world and of our experience is, in the very nature of things, impossible. Cheerfully accepting the fact, let us advance together, men of letters and men of science, further and further into the ever-expanding regions of the unknown (p. 118).

And, we might add, into the expanding literacy of the twenty-first century.

In the foregoing discussion we have cited only three of the many writers whose works we think are equally inviting to non-scientists but we hope that you have been sufficiently intrigued by them to consider doing further reading on your own. We conclude with a short annotated bibliography of selected science writings, those we have cited, along with a half-dozen others, which teachers and their students in English classes will find a useful bridge from imaginative literature into science. We have kept

the list short because we felt it should be manageable and also because we wanted to focus attention on books and essays which are reasonably accessible in school and city libraries. Furthermore, consciously drawing on materials written by active scientists, we have included selections which cover a wide scientific experience ranging from theories of scientific education through medicine and biology to physics because we hope to suggest at least some readings which will appeal to all tastes and interests. Finally, we would like to emphasize that this list is only a beginning. We see it as an appetizing hors d'oeuvre which may tempt teachers and students and sharpen their appetites for science writing in the quest for literacy.

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Huxley, Thomas H. Science and Education: Essays. NY: D. Appleton and Company, 1910, Reprinted, Norwood Editions.

Seventeen essays. Particularly recommended: "On Science and Art in Relation to Education." Engagingly written by the "father of scientific education," this essay reminds us that relations between science and art have long been uneasy and that thoughtful people have long seen the value of bringing the two traditions together through education.

The Mystery of Matter. Ed. Louise B. Young. NY: Oxford University Press, 1965.

Particularly recommended: Part 11, "Is Science Destroyer or Creator?" Through a varied collection of writings from science and imaginative literature, this serves as a highly readable introduction to the philosophy of science and society and to the study of relationships between them.

Science and Society: Selected Essays. Eds. Alexander Vavoulis and A. Wayne Colver. San Francisco: Holden-Day, 1966.

Fifteen essays. A treasure trove of science writing by such superb and authoritative authors as Jacob Bronowski, John Z. Young, Erwin C. Schrodinger, Werner Heisenberg, and Ernest Cassierer. Particularly recommended: Norman Campbell's "The Explanation of Laws," Banesh Hoffmann's "Wave or Particle?" and Michael Polanyi's "Passion and Controversy in Science."

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Twenty-nine essays, all informative and delightful. As Joyce Carol Oates wrote in her review, "_The Lives of a Cell_ anticipates the kind of writing that will appear more and more frequently as scientists take on the language of poetry in order to communicate human truth too mysterious for old fashioned common sense."

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Twenty-nine essays. An engaging exposition, through short essays, on the beauties and surprises of the biological universe and its interrelationship with human beings.

Language, Literature and the Humanistic Tradition: Necessities in the Education of the Physician

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Medicine is an art and a science. And, it is ultimately the most humanistic of all of the disciplines, for it seeks to heal the body and the mind of man. The humble roots of medicine are grounded in the classic literature of antiquity and the lofty branches are high in the brilliant atmosphere of science. But, as with many tall trees, when the nourishing source of life is far from the germinating buds, the fruit can be mishapen and unpleasant to taste.

We realize how far we have come away from our roots when we read or know of physicians whose greed for personal gratification or glory has led them to sacrifice the humanism on which their profession is based. We celebrate in our hearts those doctors who show by their conduct that they truly understand the first aphorism of Hippocrates that, "Life is short, and the art long; the occasion fleeting; experience fallacious, and judgment difficult. The physician must not only be prepared to do what is right himself, but also to make the patient, the attendants and the externals cooperate" (from "Writings of Hippocrates," in Ralph H. Major, Classic Descriptions of Disease, With Biographical Sketches of the Authors. Baltimore, MD: C. C. Thomas, 1939, P. 3).

For Hippocrates, observation of the sick person and synthesis of observations into a pattern of the disease process becomes the key to understanding the nature of the affliction besetting the patient. This knowledge also has its pragmatic usefulness to the physician. Since by cultivating the ability to prognosticate, the physician will be esteemed to be good, "for he will be better able to treat those aright who can be saved, from having anticipated everything; and by seeing and announcing beforehand those who will live and those who will die, he will thus escape censure" (p. 4).

Observation and description of events with a sense of their relationship over time underlie the physician's narration of a clinical history. However, to communicate these patterns to others one must develop the skills of language and learn how to concatenate mere words into metaphors which organize our consciousness of the world around us. Hippocrates described the countenance of the patient in whom death is impending as one having, "a sharp nose, hollow eyes, collapsed temples; the ears cold, contracted, and their lobes turned out; the skin around the forehead being rough, distended, and parched; the color of the whole face being, green, black, livid, or lead colored" (p. 5). This is known the world over as the "Hippocratic facies," and this term in itself has become a universal metaphor for the appearance of the patient in whom certain death is at hand.

I emphasize the value of observation and description of complex life processes, and the ability to use language to extract the essence of this experience in order to communicate it to others as an analog of experience, to make a point. To function well, the physician must act as a parallel processor, a pattern recognition device who tempers observation and action with the qualities of compassion and empathy to fulfil the dual role of scientist and humanist. Unfortunately,

the present approach to the education of the future physician and scientist is failing to develop these qualities essential to communication and humanism. Current premedical and medical teaching deliver education in a format which is too rigorously scientific, in a linear rather than integrative way, and in a way which de-emphasizes the interaction with human experience. As a result, we all too often read physician's notes which are dry, uninformative catalogues of events with the flesh, blood, and emotion wrung out of them. More disturbingly, we hear a patient referred to in a dehumanizing fashion as an anatomic abnormality, "the fractured femur in bed two", or as the living manifestation of a biochemical process gone wrong, "the little glycogen storage disease in the nursery."

While there are many reasons for the humanistic educational failures that we produce as graduates of our colleges and universities, part of the problem may lie in our failure to find ways to compensate for the early-childhood acquisition of a disproportionate amount of information from the two dimensional medium of television rather than the four dimensional medium of life. TV minimizes two-way communication and more important, it is not structured to emphasize the conscious creation of an awareness of the events seen, nor does it impart a realistic sense of time or process. The viewer-student is not forced to create a metaphoric description of what has been seen. As a result, he develops a poor structure of conscious awareness, which may lead to an acting out rather than to an internalization of the process experienced. For example, we often see in children a mimicking of the perceived acts of violence seen on the screen, rather than an understanding of the pain and suffering incurred by the victims of such violence.

I believe that there is a great deal of evidence to support Julian Jayne's contention, in his book on the bicameral mind, (The Origins of Consciousness in the Breakdown of the Bicameral Mind NY: Houghton Mifflin Co., 1976) that metaphor and analog are the means by which we create a structure to our consciousness that enables us to view the present and the future with a sense of self. Without a sense of self involvement, it is not possible to develop those qualities of empathy and compassion which are the hallmarks of the good doctor, and without a comfortable use of language as a means of structuring our feelings it is not possible to communicate them to others. It is often said that the physician treats the disease, but the doctor treats the patient. We train lots of physicians, but educate few doctors.

The doctor like the writer needs to develop skills in metaphor generation and in the use of language for communication, which accurately describe events and processes in a humanistic manner. Below are two passages presented as examples of the similarity in approach to compassionate description fitting the needs of the doctor and the writer; each passage fits the needs of its author. The first is by Aretaeus, the Cappadocian, a physician of the second century A.D., describing acute suppurative tonsilitis. The second, written by Giovanni Boccaccio, is from

the introduction to the Decameron describing the epidemic of bubonic plague in Florence which occurred in 1348.

Aretaeus by his metaphor of fire or carbuncle, meaning a live coal, conveys the sense of a soul in the torments of a Hell in life, brought to surcease only by death itself, but his description of the disease process is also an accurate and complete narrative of the clinical course.

> The manner of death is most piteous; pain sharp and hot as from carbuncle; respiration bad, for their breath smells strongly of putrefaction, as they constantly inhale the same again into their chest; they are in so loathesome a state that they cannot endure the smell of themselves; countenance pale or livid; fever acute, thirst is if from fire, and yet they do not desire drink for fear of the pains it would occasion; for they become sick if it compress the tonsils, or if it return by the nostrils; and if they lie down they rise up again as not being able to endure the recumbent position, and if they rise up, they are forced in their distress to lie down again; they mostly walk about erect, for in their inability to obtain relief they flee from rest, as if wishing to dispel one pain by another. Inspiration large, as desiring cold air for the purpose of refrigeration, but expiration small, for the ulceration, as if produced by burning, is inflammed by the heat of the respiration. Hoarseness, loss of speech supervene; and these symptoms hurry on from bad to worse, until suddenly falling to the ground they expire (The Extant Work of Aretaeus, the Cappadocian. Ed. and Trans. Francis Adamis. London: Sydenham Society, 1856, p. 253).

Boccaccio also conveys the inevitability of a horrible spreading death but adds the artist's license of attributing causation to the divine wrath of a just God.

> I say, then, that the years (of the era) of the fruitful incarnation of the Son of God had attained to the number of one thousand three hundred and forty-eight, when into the notable city of Florence, fair over every other of Italy, there came the death dealing pestilence, which, through the operation of the heavenly bodies or of our own iniquitous dealings, being sent down upon mankind for our correction by the just wrath of God, had some years before appeared in the parts of the East and after having bereft these later of an innumerable number of inhabitants, extending without cease from one place to another, and now unhappily spread toward the West. And there against no wisdom availing nor human foresight (whereby the city was purged of many impurities by officers deputed to that end and it was forbidden unto any sick person to enter therein and many were the counsels given for the preservation of health) not yet humble supplications, not once but many times both in ordered processions and on otherwise made unto to God by devout persons—about the coming in of the Spring of the aforesaid year, it began in horrible and miraculous wise to show forth its dolorous effects, yet not as it had done in the East, where, if any bled at the nose, it was a manifest sign of inevitable death! Nay, but in men and women alike there appeared at the beginning of the malady, certain swellings, either on the groin or under the armpits, whereof some waxed of the bigness of a common apple, others like unto an egg, some more and some less, and these the vulgar named plague-boils. From these two parts the aforesaid death-bearing plague-boils proceeded, in brief space, to appear and come indifferently in every part of the body; wherefrom, after awhile, the fashion of the contagion began to change into black or livid blotches, which showed themselves in many (first on the arms and on the thighs) and after spread to every other part of the person, in some large and sparse and in others small and thick-sown, and like as the plague-boils had been first (and yet were) a very certain token of coming death, even so were these for every one to whom they came.
>
> To the cure of these maladies nor counsel of physicians nor virtue of any medicine appeared to avail or profit aught.

Because the writer needs to have a broader view of disease than does the physician,

Boccaccio provides the sense of the historical tragedy occasioned by the outbreak of plague.

> Alas, how many great palaces, how many goodly houses, how many noble mansions once full of families, or lords and of ladies, abode empty even to the meanest servant. How many memorable families, how many ample heritages, how many famous fortunes were seen to remain without lawful heir. How many valiant men, how many fair ladies, how many sprightly youths, whom, not others only but Galen, Hippocrates or Easculapius themselves, would have judged most hale, breakfasted in the morning with their kindsfolk, comrades and friends and that same night supped with their ancestors in the other world.

In contrast, the physician is constrained by experience and training to choose a metaphoric structure to his descriptive language that develops a structure of consciousness allowing for further investigation from the same group of observations. This language structure also projects the imperative for therapeutic action; if and when the real, not the theologic, cause of the malady becomes known. Consider, for instance the description again by Aretaeus the Cappadocian, of the disease we now know as diabetes mellitus.

> Diabetes is a wonderful affection, not very frequent among men, being a melting down of the flesh and limbs into urine. Its cause is of a cold and humid nature, as in dropsy. The course is the common one, namely, the kidneys and bladder; for the patients never stop making water, but the flow is incessant, as if from the opening of aqueducts. The nature of the disease, then, is chronic, and it takes a long period to form; but the patient is short-lived, if the constitution of the disease be completely established; for the melting is rapid, the death speedy. Moreover, life is disgusting and painful; thirst unquenchable; excessive drinking, which, however, is disproportionate to the large quantity of urine, for more urine is passed; and one cannot stop them either from drinking or making water. Or if for a time they abstain from drinking, their mouth becomes parched and their body dry; the viscera seem as if scorched up; they are affected with nausea, restlessness, and a burning thirst; and at no distant term they expire. Thirst, as if scorched up with fire. But by what method could they be restrained from making water? Or how can shame become more potent than pain? And even if they were to restrain themselves for a short time, they become swelled in the loins, scrotum, and hips, and when they give vent, they discharge the collected urine, and the swellings subside, for the overflow passes to the bladder (The Extant, p. 338).

Written in the second century after Christ, this is indeed a remarkably accurate portrayal of this disease, made even more impressive in the preciseness of its organizing metaphor that diabetes is "...a melting down of the flesh and the limbs into urine." Its accuracy is especially impressive since seventeen hundred years later we have just come to understand that the biochemistry of this disease is a pathophysiologic conversion of muscle protein and body fat stores into excess production of glucose, which cannot be metabolized in the absence of the hormone insulin. The glucose produced by this gluconeogenic process is therefore excreted by the kidney, osmotically carrying with it large quantities of body water as urine. Indeed, it was the discovery in the 18th century by Willis (courageous fellow) that the large quantity of urine described by Aretaeus, "as if from the opening of aqueducts," was sweet "as if imbued with sugar or honey," that opened the modern era of biochemical investigation of disease.

The fascination that both writers and physicians have for each other's thought processes and powers of observation have produced some interesting and some powerful literary works, and I believe that it is more than random chance that so many modern writers have first trained as physicians--A. Conan Doyle, A. J. Cronin, Somerset Maugham, and Chekhov, to name

but a few. What is often forgotten, however, is that the early premedical education of all of these men was in the classic tradition, where language and metaphor structured their consciousness along humanistic lines.

It is also no accident that the most famous detective of fiction, Sherlock Holmes, was modeled after the leading physical diagnostician and surgeon of his day, Mr. Joseph Bell, a teacher of A. Conon Doyle, Holmes' creator. Bell was that sort of man who uniquely combined the scientific and humanistic traditions. He saw individual men and women in the context of their social subcultures, adapting to, or suffering from their disease processes. Nowhere are the physician's powers of observation and deductive logic better synthesized with realistic descriptive writing and a sense of the classic educational tradition than in the Holmes' stories, as shown in this brief excerpt from "The Red-headed League."

> The portly client puffed out his chest with an appearance of some little pride and pulled a dirty and wrinkled newspaper from the inside pocket of his greatcoat. As he glanced down the advertisement column, with his head thrust forward and the paper flattened out upon his knee, I took a good look at the man and endeavoured, after the fashion of my companion, to read the indications which might be presented by his dress or appearance.
>
> I did not gain very much, however, by my inspection. Our visitor bore every mark of being an average commonplace British tradesman, obese, pompous, and slow. He wore rather baggy gray shepherd's check trousers, a not over-clean black frock-coat, unbuttoned in the front, and a drab waistcoat with a heavy brassy Albert chain, and a square pierced bit of metal dangling down as an ornament. A frayed top-hat and a faded brown overcoat with a wrinkled velvet collar lay upon a chair beside him. Altogether, look as I would, there was nothing remarkable about the man save his blazing red head, and the expression of extreme chagrin and discontent upon his features.
>
> Sherlock Holmes' quick eye took in my occupation, and he shook his head with a smile as he noticed my questioning glances. "Beyond the obvious facts that he has at some time done manual labour, that he takes snuff, that he is a Freemason, that he has been in China, and that he has done a considerable amount of writing lately, I can deduce nothing else."
>
> Mr. Jabez Wilson started up in his chair, with his forefinger upon the paper, but his eyes upon my companion.
>
> "How, in the name of good-fortune, did you know all that, Mr. Holmes?" he asked. "How did you know, for example, that I did manual labour? It's as true as gospel, for I began as a ship's carpenter."
>
> "Your hands, my dear sir. Your right hand is quite a size larger than your left. You have worked with it, and the muscles are more developed."
>
> "Well, the snuff, then, and the Freemasonary?"
>
> "I won't insult your intelligence by telling you how I read that, especially as, rather against the strict rules of your order, you use an arc-and-compass breastpin."
>
> "Ah, of course, I forgot that. But the writing?"
>
> "What else can be indicated by that right cuff so very shiny for five inches, and the left one with the smooth patch near the elbow where you rest it upon the desk?"
>
> "Well, but China?"
>
> "The fish that you have tattooed immediately above your right wrist could only have been done in China. I have made a small study of tatoo marks and have even contributed to the literature

of the subject. That trick of staining the fishes' scales of a delicate pink is quite peculiar to China. When, in addition, I see a Chinese coin hanging from your watch-chain, the matter becomes even more simple."

Mr. Jabez Wilson laughed heavily. "Well, I never!" said he. "I thought at first that you had done something clever, but I see that there was nothing in it, after all."

"I began to think, Watson," said Holmes, "that I make a mistake in explaining. "Omne ignotum pro magnifico," you know, and my poor little reputation, such as it is, will suffer shipwreck if I am so candid.

Finally, and most importantly, a sensitive appreciation of humanistic tradition makes it possible to develop a consciousness that permits the physician to feel and to give voice to his own feelings of frustration, anguish, and loss, as a means of learning to empathize with his patients and their families in times of need. Familiarity with the metaphors and images of great literature can sensitize the consciousness to respond anamnestically and can show that such conduct is not only permissible but virtuous and laudatory. Such a use is well illustrated in the following passage from The Plague, by Camus, in which the doctor, Rieux, distraughtly attends and then mourns the death of his friend, Tarrou.

At noon the fever reached its climax. A visceral cough racked the sick man's body and he now was spitting blood. The ganglia had ceased swelling, but they were still there, like lumps of iron embedded in the joints. Rieux decided that lancing them was impracticable. Now and then, in the intervals between bouts of fever and coughing fits, Tarrou still gazed at his friends. But soon his eyes opened less and less often and the glow that shone out from the ravaged face in the brief moments of recognition grew steadily fainter. The storm, lashing his body into convulsive movement, lit it up with ever rarer flashes, and in the heart of the tempest he was slowly drifting, derelict. Now Rieux had before him only a masklike face, inert, from which the smile had gone forever. This human form, his friend's, lacerated by the spear-thrusts of the plague, consumed by searing, superhuman fires, buffeted by all the raging winds of heaven, was foundering under his eyes in the dark flood of the pestilence, and he could do nothing to avert the wreck. He could only stand, unavailing, on the shore, empty-handed and sick at heart, unarmed and helpless yet again under the onset of calamity. And thus, when the end came, the tears that blinded Rieux's eyes were tears of impotence; and he did not see Tarrou roll over, face to the wall, and die with a short, hollow groan as if somewhere within him an essential chord had snapped.

The next night was not one of struggle but of silence. In the tranquil death-chamber, beside the dead body now in everyday clothing—here, too, Rieux felt it brooding, that elemental peace which, when he was sitting many nights before on the terrace high above the plague, had followed the brief foray at the gates. Then, already, it had brought to his mind the silence brooding over the beds in which he had let men die. There as here it was the same solemn pause, the lull that follows battle; it was the silence of defeat. But the silence now enveloping his dead friend, so dense, so much akin to the nocturnal silence of the streets and of the town set free at last, made Rieux cruelly aware that this defeat was final, the last disastrous battle that ends a war and makes peace itself an ill beyond all remedy. The doctor could not tell if Tarrou had found peace, now that all was over, but for himself he had a feeling that no peace was possible to him henceforth, any more than there can be an armistice for a mother bereaved of her son or for a man who buries his friend.

The point in this brief essay, is not that some doctors make good writers, nor is it that good narrative writing is a common feature of a good story and of a

classic description of disease. Rather, it is to emphasize that the physician serves his patients and his art best when he functions in the humanist tradition. Training in the skills of observation and description, and in the use of metaphor as a means of structuring a common consciousness are important features of premedical and medical education.

Most important, it is through the development of a humanistic consciousness that we can imbue best a sense of the patient as a person (like the doctor believes himself to be) whose psychological and emotional needs must be attended to along with his disease process. The seamless web of persona and physiologica is not derived from the scientific tradtion, although modern medical science has reluctantly come around to that view, but is rather a product of our culture and our literary heritage and is embedded in our metaphors of life, growth, reproduction, and death.

To know, to understand, and to teach the lessons of the past are the joint responsibility of both the medical and humanistic faculties of our colleges and universities. But, in a time when values are in question and there are conflicting winds of opinion, the leaves fall far from the tree. There is need for the re-establishment of the humanistic tradition of western civilization as the core program in primary, secondary and university education. For this program, an emphasis on the relationship between our language and all of our cultural roots would seem to offer a way to create anew the important aspects of a common consciousness on which our American society is based. The true reconciliation between science and humanism can occur only in the mind of each man or woman who is a scientist or physician, not in some ill-defined aspect of the non-conscious society around him or her. The use of language and metaphor to structure and shape that consciousness is too important a task to leave to the teachers of English alone. It must be developed as a clinical tool common to all disciplines, to be handled with the same care and under the same kind of peer review as we believe necessary for those who utilize the scalpel to cure or who administer any dangerous therapeutic medicine.

First Silence, Then Paper

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I came to teach at The Wyoming Writing Project in Gillette, and John Warnock told me to shut up, sit down, and write.

I was in the right place. Writing begins when teachers give their students silence and paper--then sit down to write themselves.

That isn't all there is to teaching writing, a demanding craft that is backwards to most traditional teaching.

We have to create an environment in which our students can become authors--authorities--on a subject by writing about it. Then they may learn to write by teaching us their subject, listening to our reaction to it, and revising their text until we are taught.

It isn't easy for me to be a student to my students' writing. I want to be the authority, to initiate learning, to do something--anything--first, to be a good old American take-charge guy. I keep having to re-educate myself to get out of the way, be patient, wait, listen, behave as I was commanded to behave in Wyoming.

This attitude, of course, is what I have to re-teach myself day after day, year after year as a writer: to create quiet, to listen, to be ready if the writing comes. I am a writer and a teacher, and those of us who are, each day, both teacher and learner have to teach ourselves what we teach our students. We experience the difficulty of learning at the writing desk what so glibly can be said behind the teacher's desk--"be specific," "show, don't tell," "give examples," "make it flow."

It is our job as writers to create a context in which we can write, and it is our job as teachers of writing to create a context that is as appropriate for writing as the gym is for basketball. To do that I think we must consider seven elements.

Silence

Emptiness. Writing begins when I feel the familiar but always terrifying "I have nothing to say." There is no subject, no form, no language. Sometimes as I come to the writing desk, I feel trapped in an arctic landscape without landmarks, an aluminum sky with no East or West, South or North. More often I feel the emptiness as a black pit without a bottom and with no light above. No down, no up. Soft furry walls with no handholds. Despair.

That's the starting point for good writing, an emptying out of all we have said and read, thought, seen, felt. The best writing is not a parroting of what others have said--or what we have said--before. It is an exploration of a problem we have not solved with language before. I have circled this question the editor of <u>fforum</u> placed before me, "What are the contexts in which effective writing can take place?" I write this text to solve that problem, first of all, for myself. I wonder if I have anything to say; I fear I do not, but I start making notes. I do not look so much at what others--and I--have said before, but what I find being said on my own page. The emptiness began to disappear when John Warnock gave me the gift of silence. I sat. I waited. The well began to fill.

We must begin our personal curriculum and our classroom curriculum with John Warnock's gift of silence. How rare it is that we encourage--even allow--our stu-

dents freedom from busyness, moments of stillness, relief from the teacher's voice--quackity, quackity, quackity.

How rare it is we allow ourselves stillness. I try to start each day with fifteen minutes in which I just stare vacantly out of the window into myself, notebook open, pen uncapped. My vacant staring must be as disturbing to others as a class of students looking out of the windows to themselves is to some administrators. It must seem a sign of mental illness, evidence of an acute cranial vacuum, proof you have left the company of those around you and become, in fact, a space shot. When my mother-in-law lived with me, she took such staring as a social signal that conversation was needed. When I visit in other homes, or people visit mine, my early morning vacuity (indication to me that I am having my most productive moments of the day) causes others to leap into social action--quackity, quackity, quackity.

We must begin our writing curriculum with quiet, an unexpected and terrifying but productive, essential nothingness.

Territory

Emptiness can not be maintained. The silence will fill and, if we filter out what is trivial, what we have succeeded at before, what we know, we will see and hear what surprises us. In the writing course the student is surprised at what he or she is in the process of knowing.

Again we have to turn our curriculum away from what is traditional and even may be appropriate in other subjects but is not appropriate for the learning of writing. In most courses our students come to us knowing they are ignorant of the subject matter, and we work hard to convince them of that ignorance. In the writing course our students come to us thinking they have nothing to say, and it is our responsibility to help them discover that they have plenty to say that is worth saying.

The beginning point is, again, a kind of nothingness, a responsible irresponsibility on the part of the teacher. No talk before writing, no assignments, no story-starters, no models, no list of possible topics--nothing that reveals you think the student has nothing worth saying and makes the student dependent on you for subject matter. Students will, of course, plead for a life preserver--a topic, any topic, even what I did on my summer vacation--but if you toss it to them they will not learn how to find and develop their own subjects, the basis of the writing process.

Instead of assignments--our assignments--the student is challenged to find his or her own assignments. We may have to help by drawing out of our students, in class and in conference, what they know. We may have to have our students interview each other, and then tell the class about the subjects on which the person interviewed is an authority. We may have to have our students list the subjects on which they are authorities, including jobs and out-of-class activities. But those are all crutches we use when we can not stand the silence. It is far more responsible if we have the courage to wait.

Time

Waiting means time, time for staring out of windows, time for thinking, time for dreaming, time for doodling, time for rehearsing, planning, drafting, restarting, revising, editing.

I seem, to some of my colleagues, prolific, yet most of my writing evolved over years. Some of the things I am writing this year have written roots in my files that go back for ten or twenty years. The psychic roots go deeper. We can not give our students years within an academic unit that is measured in 4 to 14 weeks, but we must find ways to give them as much time as possible. This means fewer assignments, in most courses, with frequent checkpoints along the way to make sure that time is being used.

Students need, as writers need, discipline applied to their time. There

should be a firm deadline for the final copy--announced in advance--and then deadlines along the way, perhaps for proposals, research reports, titles, leads, ends, outlines, first, second, third or even fourth drafts. There may be a quantity demand: a page a day, or five pages a week, but pages that may be notes, outlines, drafts, false starts, edits, revisions, as well as final copy.

Time for writing must be fenced off from all other parts of the curriculum. This is not easy, because we have so many pressures on us, and we try to double or triple up. Many teachers are still trying to assign a paper on a reading, correct the first draft for grammar, and say they are teaching literature, writing, and language. Writing should, of course, be used to test our students' knowledge of literature, but that is only one form--a limited, schoolbook form of writing.

We must encourage writing that isn't bound by the limits of someone else's text and isn't restricted to a single form. Students must find their way to a subject worth exploring, and find their way to use language to explore it. Dr. Carol Berkenkotter of Michigan Technological University, used me as a laboratory rat in a 2-1/2 month naturalistic protocol. She discovered that more than 60% of my time--sometimes much more--was used for planning. We must give our students a chance to sniff around a potential subject, reminding ourselves of what Denise Levertov said, "You can smell the poem before you see it." We need time for this essential circling, moving closer, backing off, coming at it from a different angle, circling again, trying a new approach.

This circling means that the writing curriculum is failure-centered. If failure is not encouraged we will only have meaningless little essays plopped out like fast-food patties into our explicit measure.

Good writing is an experiment in meaning that works. The experiment that works is the product of many experiments that fail. The failure is essential, because through trying, failing, trying, failing, we discover what we have to say.

Need

Out of time and territory need will arise. Too often, as writing teachers, we use words such as, "intention" or "purpose" too early with our students, as if such matters could, all of the time, be clarified early on with a formal strategy and specific tactics established before we know what we want to say and to whom we want to say it. The need to write on a subject at the beginning is much less than obvious purpose. It is an itch, a need to wonder about, to consider and reconsider, to mull over, to speculate.

As we give ourselves space and time we find we experience what can only be described as a sort-of-a-sensation, or a pre-sensation similar to the aura that precedes the migraine.

My mind fills by coming back to clustering specifics. Everything I read, see, overhear begins to relate itself to a particular concern. This concern is certainly not yet a thesis statement or a solution or an answer. It isn't even a hypothesis, a problem or a question. But as I give it words in my head and on my notebook page it begins to become a vision. I see a shadowy outline of a mountain range I may choose to map. I begin to have questions, I begin to define problems that may be fun to try to solve.

I have begun to be my own audience. I write to read what I have written not so much to find out what I already know, but to find out what I am knowing through writing. It is an active process. Dynamic. Kinetic. Exciting. This is what motivates the writer and the writing student: the excitement of learning and that peculiarly wonderful, significant, egocentric experience of hearing the voice you did not know you had.

Writing also satisfies the need to make. Years ago I wrote a story on General

Foods and discovered they had created mixes that were too simple and fool-proof. They had to back up and, as one executive said, "allow the housewife to put herself into the mix." A strange image, and perhaps a sexist one, but their marketing research revealed the need of making. Writing is a particularly satisfying kind of making, because we can make order out of disorder, meaning out of chaos; we can make something solid out of such powerful and amorphous materials as fear, love, hate, joy, envy, terror.

This brings us to another fundamental need, one we all, as teachers of writing, normally avoid. Beside my own typewriter is a quotation from Graham Greene: "Writing is a form of therapy; sometimes I wonder how all those who do not write, compose or paint can manage to escape the madness, the melancholia, the panic fear which is inherent in the human situation." The need to write above all else comes from the need to reveal, name, describe, order, and attempt to understand what is deepest and darkest in the human experience.

Process

The need demands process. There has to be a way to deal with the volume of information and language that crowds the writer's head and the writer's page. Quantity itself is both a problem and an opportunity--an abundance of information allows us to select and order meaning.

Too often students are forced to write without information or with just a few stray fragments of information they attempt to string together with a weak glue of stereotypes and cliches. It isn't easy to write without information. When students collect an abundance of information, however, they need to make distinctions between pieces of information--to decide what is significent and what is not--and then to follow the flow of the important information towards meaning.

It is of little value to teach skills and techniques, the processes of others, to students who do not put them into use in significant ways. Students who need techniques will develop them, and will start to share their tricks of the trade with other students who need them. Then the waiting composition teacher can pounce.

The teacher sees one student making a significant word choice, and the instructor broadcasts that to the class during the time for a class meeting when the day's writing is done. The instructor sets up pairs and small groups of students, inviting them to share their solutions and their problems. The instructor posts or publishes evolving drafts and outlines and notes to show how members of that particular class are making writing work. The teacher writes in public, on the blackboard, or with an overhead projector, revealing the teacher's own struggle to use language to achieve meaning, and inviting help from the class along the way. The instructor, in conference and in class meeting, shares accounts, techniques, and other tricks of the trade from professional writers at the moment the student defines a problem and seeks solutions. The teacher doesn't correct or suggest one solution, but gives the student alternatives so the student will decide which way to turn.

Most important, however, is the testimony from student writers who are writing well. The instructor calls attention to those pieces of writing that are working, and invites the student to tell the instructor, and the class, the process that produced the effective writing.

The case histories, first of all, instruct the writer. Usually the student has written by instinct, but when the student is asked to tell what he or she did the student discovers that the writing was a rational process. It can be described and shared. And, of course, as the student describes the process that produced effective writing to others, the student reinforces that process.

Now students begin to work in a context of shared success. The students who

write well are teaching themselves, each other, and the teacher how writing is made effective. They practice different styles of thinking and of working. They write in diverse voices and discover alternative solutions to the same writing problem. They find there is not one way to make writing work buy many.

These solutions and skills flow into a coherent process. There are some things that are especially helpful when planning a text, others to help produce a text, still others to make the text clear. These techniques overlap and interact, because writing is a complex intellectual act, but the class discovers that underneath the contradictions there is a rational reason for most writing acts--don't be too critical in the beginning or you won't discover what you have to say, don't be too sloppy at the end or the reader won't be able to figure out what you've said.

It is vital that the process is drawn out of the class experience so the class learns together that each writer is capable of identifying and solving writing problems. Learning will not stop with this class. This class will not be dependent on this teacher; this class will graduate individuals who know, through their own experience, that they can respond, rationally and skillfully, to the demands of the writing task they will face in the years ahead.

Text

The principal text--and this from the author of writing texts--of the writing course should be the student's own evolving writing.

We have the responsibility to free our students from the tyranny of the printed page. They have been taught there is a right text, and it is printed in a book. They have been taught that the teacher has the code that will reveal the meaning of that text.

Writing is not like that. There is no text; there is a blank page, and then, with luck and work, a messy page. Language is trying to discover its meaning. The writer writes not knowing at first what the writer's own text is meaning, and then has to perceive the potential meaning in the confusion of syntax, misspelling, poor penmanship, and disorganized, searching thought.

Decoding a messy, evolving student text is a frightening challenge for most teachers, because they are untrained for this task. But writing teachers and their students have to learn to read unfinished writing. The use of finished models by far more talented writers is of little help unless the students see their early drafts, their clumsy and awkward sentences, their false sense, their early drafts that document how badly they had to write to write well.

Students publish their drafts in small group and whole class workshops where the writer is asked, "How can we help you?" I prefer to publish only the best drafts from the class to show good writing being made better. The text in the writing course is not what was once written, but what is being written.

Response

The writer needs response when it can do some good, when the writing can be changed, but in school we too often respond only when the writing is finished, when it's too late.

Professionals seek out writers who can help them when it counts. I call Don Graves, Chip Scanlan, or others, for I am blessed with many good writing colleagues--or they call me. We read a paragraph or two over the phone that needs a test reader right now. Not for criticism, not even for confirmation, but mostly for sharing.

Experienced writers need test audiences early on, and it is the challenge of the writing teacher to become the person with whom the student wants to share work that is still searching for meaning. It is