Question(s) of Culture(s)

Steven Kornuth, Editor

The current debate over the core curriculum has pitted the thread of our intellectual history against the thread of our individual genomes. One voice insists that examples of the cultural expression of each unit of the Jungian “collective unconscious” (ethnic, racial, gender) be taught in order to validate the meaningfulness of that unit. The other voice insists that only Western history be examined, because intrinsically it has a higher value than others. It is as though we were limited to the Kierkegaardian option of “Either/Or.”

There are alternative voices that press the search for a common thread of experience, as revealed by an in-depth study of the history, arts, and sciences of one culture, in order to develop the foundation for an understanding of our individual being.

“Whatever may happen to you was prepared for you from all eternity; and the implication of causes was from eternity spinning the thread of your being,” Marcus Aurelius Antonius said in his Meditations. The immersion of students in the recorded experiences of a particular civilization permits them to view the evolution of the common myths, larger-than-life truths, over generations with different political, social, and economic systems and psyches.

Single Truth, Different Perspectives

For example, the struggle of the parent-child relationship in the story of Electra, related from the fourth century B.C.E. Greek perspective of Sophocles, Euripides, and Aeschylus or from the late 19th century German perspective of Richard Strauss, can be viewed as a single truth. The tales deal with the same characters, revealed through different perspectives that represent the periods in which the tale was written. The same is true of our other great myths, such as the struggle of man with God or with the Devil, as recounted by Marlowe, Goethe, and Gounod, and most recently portrayed in the masterful film Mephisto.

The benefits of a study of a common history and culture are reflected in T.S. Eliot’s words, “Time present and time past are both perhaps present in time future / And time future in time past.”

This issue of Professional Scholar presents three facets of the issue of core curriculum. In an intellectually exciting and challenging article, Rustum Roy, professor of Materials Sciences at Pennsylvania State University and a member of the National Academy of Sciences, proposes restoring the meaning of “uni-” in “university.” The fusion of knowledge from the great books with concepts of ethics, science, and technology has been the goal of many educators. Roy addresses the economic, social, and political factors confounding this search.

James Mirollo, chair of the Columbia College Literature Humanities course, presents the purpose of the course in the education of emergent scholars. He provides a wonderful image, that of scholars sipping the contents of the course together.

Laurence M. Porter, professor of French and Comparative Literature at Michigan State University, discusses the need to link marginalized members of our society and “the center,” to enrich the experiences of all in an increasingly pluralistic world. As an example, he outlines a curriculum that exposes students to a wide range of thought and expression.

A challenging aspect of his discussion is the comment that the course may help a white male acquire “a more sophisticated basis for promoting the merits of his own traditional culture.” The problem that arises is that the new curriculum of diversity can be perceived as simply a comparison of the relative merits of different cultures, without going beyond that stage to transcend the constraints of our tribal and gender boundaries.

The attempt to validate the contributions of specific peoples, by representing the thoughts, literature, technology, and arts of their predecessors, carries with it the potential failure to validate others by lack of inclusion. This editor sees education as the weaving of a fabric from the thread of a common continuous written history, whose embellishments are the designs created by particular ethnic and gender experiences. As always, we welcome thoughts and insights from you, our colleagues. PS

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Restoring “Uni” in the University
Rustum Roy, Pennsylvania State University

Clark Kerr long ago described the transmogrification of the university into the multi-versity. But the accuracy of this description and the impact on higher education of the reality behind the description has never been fully acknowledged.

The fact is that the centripetal forces of “unification” of knowledge that were once at the heart of the institution called the uni-versity have been routed. The victorious centrifugal forces in the contemporary research university are: increasingly narrow disciplinary specialization; the absurd continuously running research funding racket, which distracts our best minds; the explosion of relative ignorance (often mistitled the explosion of knowledge); the continued whining by the most affluent (the scientists) about obsolete equipment (last year’s model) when they haven’t had a day to think or reflect all year; and the institutional fundamentalism that has academics in thrall as surely as the Ayatollah controls his minions.

The multi-versity survives — indeed, William Bennett is certainly accurate in saying it thrives financially. And that, of course, has so far been reason enough to resist paying serious attention to at least one of the university’s principal functions — the unifying function. Thank God, then, for the purifying potential of the lean years ahead.

Discovering and proclaiming great unities should be the university’s most important function in culture. Which other institution in society could possibly be appropriate to unite the grand traditions, handed down from one generation to the next, with the latest knowledge, insights, deep truths, and, indeed, problems and challenges that confront us now? And in a culture where the incredibly seductive and powerful forces of technology and science define what is characteristic and unique about our own culture, the unifying of Western values with the meanings of science and technology must surely be the focal point of the intellectual raison d’être of the modern American university.

How sad that the mind of Allan Bloom, concerned as he was about opening the American academic mind, was, in his well-received book, so closed to half of the modern intellectual ferment. How revealing of the intellectual-spiritual fragmentation of modern culture that one who championed, with my whole-hearted support, much greater emphasis on the substance of Western tradition and religion, should fail to see that his very neglect of science and technology doomed the utility of his approach. How ineffectual his case, when he is unable to bring his protest to a focus in recommended changes that involve and incorporate the worlds of science and technology with those of the received wisdom.

How appropriate also that, at the threshold of a new era, not only are the boundaries between disciplines being exposed for their artificiality, but their dysfunctionality in every aspect of teaching and research stand clearly exposed. How appropriate to this era of boundary-crossing it is that an intelligent, educated politician who happened to be the president-elect should speak more, and more cogently, about the content of education than any president of Harvard or Yale or Stanford.

Here is Bill Clinton writing in the National Academy of Sciences publication, Issues in Science and Technology:

Mathematics and science education must not simply become more widely available and technically enriched. They must also be embedded in a broader education about the ethical, moral, and social implications of technology. In some ways our technological expertise already exceeds our capacity to deal with its moral implications. To create a new generation of scientists ill-prepared to make morally complex social decisions would not be in the best interest of the country.

Imagine that. The incoming president of the U.S. daring to put on the table a clear simple example of what would put “uni” back into the university: embedding mathematics and science in a broader education about the ethical and moral and social implications of technology.

Now, I can speak with pretty fair confidence that, in spite of the tiny flower of hope referred to below,
there is probably not a single major research university that requires even a minor bow toward unification of knowledge, even one course in Technology and Society in the 90 credits required for a Ph.D. I will be happy to be proved wrong, even in the exceptional case.

Yet strangely enough, unknown to the critics and unremarked by observers of the university world, the seeds of this very unification synthesis we seek in a university are already sprouting, not in the unapproachable, refined air of the research universities alone, but throughout the educational system.

"Science, Technology, and Society"

I refer to the "movement" (no other word seems appropriate) that has come together under the title "Science, Technology, and Society," or STS as it is now universally called. I believe it can be asserted accurately that no other field has more rapidly established itself within the American academic world as STS.

Probably nearly 2000 colleges teach a course or two that, by this or any other name, deal with STS. Nearly a hundred official "programs" or departments of some kind exist on as many campuses. Thousands of secondary school teachers see STS as the essential "math and science" needed by every citizen, not just the 5% who may one day use it professionally.

STS today is diffusing ever more widely into the mainstream of American academic life. But it is also, in a few places, penetrating more deeply into the intellectual life of the end of the 20th century.

The perspective I wish to present in the following is that STS is the vanguard of the "counter-development" forces opposing the century-long atomization, by specialization, of the university. STS advocates breadth over ever-increasing depth. It seeks to show the structure of relationships among disciplines, events, and world views more than to provide more knowledge about each. It is very interested in science, more so in technology, but mostly in how each interacts with the other, and with society.

STS approaches science and technology from the societal end but is, therefore, no less either appreciative or critical of them. In today's jargon, STS can accurately be described as holistic and right-brain, when compared with the typical left-brain, specialized discipline.

But the STS movement is infused by a grand vision. This vision is nothing less than reinventing the university, moving toward a new cultural synthesis of the best of tradition with the best of the influences of technology and science.

STS on a major campus is typically a group of faculty drawn from the widest spectrum of disciplines, determined to engage in the unifying dialogue that is central to the university, and to ensure that the students are exposed not only to the Great Books and their ideas, but to the possible connection between the Symposium and Special Relativity, and the contact between the Bible (as the religious guideline Bloom would have it) and bioethics.

General education, presumably, is the place in the curriculum where unification could be achieved. The spate of general education reforms is testimony to the universal awareness that, instead, on most campuses general education remains a pork barrel for distribution of large enrollment "service" courses.

Now, for the first time, in STS, a set of integrative principles has emerged, which forms an intellectual core for much of general education, decisively different from the "course distribution" requirements of a Chinese dinner. It is the genuine fusion of ideas, knowledge, and values from different fields that counters the fissioning of knowledge over the last century. This integrative style also helps, by contagion, to render more porous the walls between the more specialized reaches of the disciplines.

It is perhaps not an unreasonable projection to see the development of integrative general education with STS at its core as the emergence — finally — of the university within the multi-verse it can no longer supplant. In my view the only realistic scenario by which we can reinvent the university — integrated, interdisciplinary, general — alongside the other units of the multi-versity — differentiating, disciplinary, specialized — is by assigning the core of general education to STS taught by an interdisciplinary interacting faculty.

The Core Curriculum Idea

James Mirollo, Columbia University

As chair of Columbia College's Literature Humanities, I am frequently called upon to defend not only the course itself but the Core Curriculum of which it is a key part. The opposition may be fairly summed up in remarks Francis Oakley made in his article, "Against Nostalgia: Reflections on Our Present Discontents in Higher Education," in the National Humanities Center Newsletter (12:2, Spring-Summer 1991, pp. 1-14), in which he referred to "the core-curricular approach with its reverential canonization of 'great books of the Western tradition'.'"

Noting that such an approach is "a specifically American creation, and one of comparatively recent vintage," he argued that "even in its heyday its appeal was fairly limited, and whatever its virtues (and they are real) I cannot find that the only way forward today lies via a retreat into its particular past."

There is much here that is worth untangling, but I draw attention only to what Oakley's remarks reveal about persistent errors or confusions about the nature and purpose of a core curriculum.

At Columbia there is nothing resembling "reverential canonization" of "great Western books." Not just our required and elective offerings in Eastern and other cultures, but the contents of our Contemporary Civilization and Literature Humanities
courses would belie the cliché Oakley and others frequently float.

Would he classify the Homeric *Hymn to Demeter* or *To the Lighthouse* thus? And how about Christine de Pisan and the plays of Hroswitha, the latter well-known to him as medievalist?

Also, he assumes that a core curriculum is identical with a fixed content, and that the fixed content must be dominated by Western “great books,” whereas in fact the idea of a core curriculum refers first and foremost to the container or packaging, not the contents, which can be filled in with whatever general education contents are deemed desirable at a particular time — general education now being assumed to include knowledge of other than Western culture, for example.

Granted that the container and the contents influence each other, still the rationale for a core curriculum is not the privileging of a particular content but the belief that a group of students should study a basic group of subjects during the early years of college, and do so in common, before going on to elective and professional choices. What those subjects should be is decided by the faculty who teach the core courses.

“Great Western books” such as Oakley and others imagine the reading list to be are studied in some core courses, but the whole is hardly equivalent to such a reading list. Our core curriculum, after all, includes not just several semesters of science, foreign languages, and English composition but also required courses in other cultures and in contemporary issues of race, gender, class, and environment that transcend “Western” focus. Nevertheless, in those courses that take up Western works of literature, philosophy, history, art, and music, we believe there is a rationale for their inclusion, if not centrality, in a core curriculum.

One Example: Literature Humanities

Let me focus on my own course, Literature Humanities, as a primary example. We have always emphasized that it is valuable for our beginning students to discuss the *Iliad* together in the dorms, because it is a powerful and resonant text that raises lots of fascinating questions and answers that are intellectually empowering — not because it is “a revered great book” of the Western tradition.

In fact, while it has stayed on our course reading list since 1937, it has often been threatened with expulsion by a critical teaching staff, and its counterpart, the *Odyssey*, was summarily dismissed during the late 1950s and early 1960s. Only three books on our current list (the *Iliad*, Augustine’s *Confessions*, Dante’s *Inferno*) have never left the list, and nearly 150 different texts have appeared on it since 1937. That is hardly reverential, and certainly not an unassailable list of so-called great books. (Indeed, one local wag has referred to it as a “loose canon.”)

Critics like Oakley are against nostalgia, but by insisting that the core-curricular approach is recent, he implies approval for the age-old. He damn it for being both recent and American. Even in its heyday, he argues, its appeal was “fairly limited.”

One may ask when was this “heyday”? The pre-World War II period? And if “limited” appeal means not many schools tried it, the evidence suggests otherwise. Some would even say now is its heyday, though I would disagree, since it is clear that the so-called “distribution” idea of a curriculum holds sway.

In any case, Columbia College has not thus far “retreated” to its past because it has never left it. But this is neither nostalgia nor reverence.

Among the many diverse and rich curricular possibilities American higher educational institutions offer undergraduates, ours is but one or one type. We think this diversity of choice is healthy, for both the institutions and the students who choose them.

More important than whether or not Columbia College is a target of criticism is the persistent error of identifying the idea of a core curriculum with a particular set of books, or with a historically understandable but no longer valid rationale of opposing the abuses of the elective system.

If there are real virtues in the idea of a core here and now, then history has not blunted them. As we have shown here at Columbia, the core container is expandable and can hold any contents we decide should be in it. For us, the key is the belief that we can decide upon the contents and defend their value — and the value of having all of our students sipping them together. That is the real idea of a core curriculum.

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**Heads Up!**

**New Publications of Interest:**

**Critical Thinking** (semiannual journal). Editor: Richard Paul. Published by the Center for Critical Thinking and the Foundation for Critical Thinking, 4655 Sonoma Mountain Road, Santa Rosa, CA 95404; Ph: 707/546-4926. “The only international magazine that specifically addresses the concerns of educators and public citizens committed to the development of critical thinking as a tool for learning and as a primary social value for the 21st Century.” Focus: all levels of education (K-12 through postsecondary). Subscription: $9.95.

**Crimes Against Freedom: A Newsletter Dedicated to Reclaiming Freedom of Print, Speech, and Dissent** (quarterly newsletter). Editor: Stephen Lyons. In the first issue (Fall 1992), Lyons states, “What this newsletter will expose are what we perceive to be abridgements of free speech and ask how a society supposedly dedicated to truth and justice can at the same time sanction the muzzling of its scholars and critics.” Editorial: CAF, P.O. Box 3673, Moscow, ID 83843; Ph: 208/882-9749. Subscriptions ($10 annually): CAF, 2919 N. Downer Ave., Milwaukee, WI 53211.
Multicultural Approach as Basic Education
Laurence M. Porter, Michigan State University

Whatever the discipline I teach in the humanities — and I teach five of them — and whatever the level of the students, from first-year to doctoral candidates, my basic goal is to help people to learn to read and write. By “reading” I mean being able to understand written communication; by “writing” I mean verbal self-expression. The skills thus developed should help our graduates in any walk of life.

But when they are lacking in the most basic communication aptitudes, how can we afford the luxury of introducing them to a variety of cultures? When they lack a historical perspective and a basic knowledge of our cultural heritage, how can we squander our limited time with them on what many traditionalists consider peripheral subjects?

The answer is that “history” and “culture,” as they are implicitly defined in this objection, impose a limited vision and conceal from us a major part of the past from which our present comes. They refer to curricula that were devised between roughly 1880 and 1940, during an era when race, class, religion, gender, and nationality effectively excluded more than half of our most intellectually able people from a “higher” education. As The Autobiography of Malcolm X forcefully demonstrates, we can enhance the language abilities of the marginalized members of society by motivating them to learn, and we can motivate them by introducing them to study materials that speak to their condition.

To avoid subservience to a valuable but increasingly partial and inadequate body of knowledge defined during an era of segregation and discrimination in the U.S. and the world, we must simultaneously consider what to communicate, how to communicate, and to whom. Indeed, the “what” and the “how” are fundamentally changed by the “to whom.”

We live in a different world than we knew 40 or 50 years ago. The collapse of Western Communism, the breakup of massive colonial empires in Africa and Asia after World War II, the development of world-wide communications capacity, the growth of a world economy with interdependent parts, and above all the global threats to our environment, all mean that we all have a vested interest in learning more about the people of the “Third World,” a leveling term that itself betrays a profound ignorance of our co-planetary.

Greed, enlightened self-interest, and altruism all concur in making a broader understanding of our worlds imperative. In the U.S. alone, blacks have emerged as the dominant political power in the Northern industrial cities and Hispanics in the Sunbelt ones (a recent book was entitled Los Angeles, Capital of the Third World), while the silent majority of women has just begun flexing its political muscle everywhere. It makes no sense to inculcate a canon of texts and outlooks that excludes — or worse yet, disparages — the experiences of three-quarters of our population.

In the real world, placing different groups side by side is a recipe for conflict. But such proximity has become inescapable. We had better have something to say to each other.

Yet in North America the study of literature has remained curiously parochial. The vague discipline called “Comparative Literature” has long promised a broader view, but in practice it has usually been limited to a canon of works from Western Europe, with Ancient Greek and German exalted as the “prestige languages” among specialists.

Reactions against this restrictive curriculum — Women’s Studies, Black Studies, Cultural Studies, and Regional Studies, among others — have rightly called attention to neglected areas of world culture, but often at the cost of isolating and “ghettoizing.” We need courses that will link the margins and the center, so that students who find themselves at either pole will be able to enrich their experience and their capacity for self-expression, and become empowered to understand an increasingly pluralistic world. I offer an example of such a course, tested in the classroom, below.

Curriculum for Pluralism
The following curriculum of eight two-hour lectures or discussion sessions can be used in any of three ways:

• as an invitation to read, with no homework required;
• as a course for an educated general audience, with required reading of the primary texts only;
• as a course for graduate students or advanced undergraduates, with required reading of both primary and secondary texts (criticism).

The first term in each title below refers to that which has been marginalized in relation to the second, canonical term.

1) “If English was good enough for Jesus, it’s good enough for me.” “Foreign” languages, our native language, and how the betrayal called translation supports vested interests. **Reading:** Sigmund Freud, “Beyond the Pleasure Principle,” Parts I-IV. **Optional:** Bruno Bettelheim, *Freud and Man’s Soul*. The medical establishment in England and the U.S. co-opted Freud (who supported psychoanalysis by non-M.D.s) by transforming his pithy, down-to-earth writing into a tangle of scientific, mentalistic jargon; instead of “mind,” for example, he nearly always wrote “soul,” meaning to him the essential core of the personality.

2) Oral culture and print culture: assimilation and condescension. **Reading:** a Wolof tale from West Africa, its literary rendering, and its “exoticized” version in Joel Chandler Harris’s Br’er Rabbit tales and Walt Disney’s *The Song of the South*. Literary elaboration erases most of the rich speaker-
audience exchange (see the writings of Henry Louis Gates or the public addresses by Malcolm X in the film of his life); the presentation of Uncle Remus as a "wise old man" who tells stories neutralizes him by limiting his power to something transient and verbal.

3) Popular culture and high culture: aesthetic discrimination or class hegemony. **Reading:** Pierre Boule, *Planet of the Apes. Optional:* Pierre Bourdieu, *Distinction,* chapter on "the habitus." Popular culture pure and simple, I would say, ventilates anxieties and gratifies desire. Boule's work, on the borderline of high culture, remains ambivalent. It alternately endorses and condemns racist and sexist oppression, in the wake of the loss of the French colonies to a variety of dark-skinned races (disguised here as the apes). The only competent woman in the main narrative is an ape; and in the frame narrative, another she-ape again comes under her mate's linguistic and emotional authority.

4) Women's literature and the mainstream. **Reading:** Mary Shelley, *Frankenstein. Optional:* Ellen Moers, *Literary Women,* chapter on Shelley. What was once seen as a sensationalizing pot-boiler is considered by some critics as the epitome of English Romanticism. Yet Moers also demonstrates how *Frankenstein* reflects the experience peculiar to women — the anguish of childbirth.

5) Can non-fiction be literature? The case of autobiography. **Reading:** The Autobiography of Malcolm X. **Optional:** Augustine, *The Confessions* (selections); Jean-Jacques Rousseau, *Confessions* (selections); Thomas De Quincey, *Confessions of an Opium Eater* (selections). Spike Lee's film subtly glorifies Malcolm X in many ways; in contrast, the latter's confessional narrative, which is fine literature, enhances his stature by revealing his inner struggles even long after conversion.

6) "Third World" literature and the Great Tradition. **Reading:** Homer, *Iliad; Sundiata* (the epic of Mali). One can make a strong case for Homer as an antiwar poet who subordinates women, while *Sundiata* glorifies a just war but also grants women a more prominent role. Life is too complex to allow most imaginative authors to be entirely "politically correct," and, if we look at how we benefit from past and present oppression, none of us are politically correct either.

7) Losers and conquerors: colonialism and its critics. **Reading:** Shakespeare, *The Tempest; Aimé Césaire, A Tempest.* Additional or alternative readings that face the problem of blacks oppressing blacks, and that work well in class, are Derek Wolcott's play, *A Dream on Monkey Mountain,* and Alejo Carpentier's *The Kingdom of this World,* which extends its exploration of oppression into ethology.

8) Relativism vs. ideology: fantastic, parodic, and didactic modes of literature. **Reading:** E.T.A. Hoffmann, "The Sandman"; Goethe, *Faust,* Part I; The Book of Job. **Optional:** Milton, *Paradise Lost* (selections). Even at the core of mainstream culture, the fantastic and the parodic modes call into question a monolithic view of the external world.

Versions of a number of the above works have been made into films, a list of which can be provided to participants in the course.

**Benefits for "Majority Students"**

What can the well-to-do white male derive from such a course? An exposure to world literature, the adventure and intellectual stimulation of variety, and — last but not least — a more sophisticated basis for promoting the merits of his own traditional culture. More important, such a course provides a common ground for a free and open exchange of views, the basis of any humanistic education.

**UK: Research Assessment**

Robert Magnan, Associate Editor

National research funds continue to decline. Institutions of higher education need more funding. What's the best way to determine how to most effectively allocate resources?

In the United Kingdom the answer recently came in the form of the first official national assessment of research quality in higher education. At stake in the assessment, the results of which were announced Dec. 11, 1992, is more than £ 650 million (about $930 million U.S.) in support from the Universities Funding Council, to be allocated this spring.

That funding is increasingly crucial to schools in the UK, a nation that has dropped to seventh in the world in spending on scientific R & D as a proportion of the GNP, according to the Office of Science and Technology. Third in 1981, Britain now ranks after Japan, Switzerland, Sweden, Germany, the U.S., and France.

More than 450 leading researchers, industrialists, and civil servants rated the work of 43,000 academics in 72 subject areas at 172 institutions. They used a five-point scale, with a 5 indicating that a department has achieved international standards of excellence and a 1 branding a department as unworthy of research funding. The ratings also produced a composite rating for each institution.

To participate in the assessment, each department had to complete a form, listing staff members, publications, research contracts, and other indicators of research quality — reports that typically weighed in at 30-40 pages each. Every institution then collated the department forms and sent them to the Higher Education Funding Council for England, where council members and committees of experts spent months working through hundreds of thousands of pages to arrive at their ratings.

Similar assessments were conducted in 1986 and 1989, but they covered only "traditional universities." This time the colleges and the former polytechnics were also invited to go for the gold.

At the top of the ratings heap, as one might have expected, was Cambridge (4.69), followed by Oxford.
and the London School of Medicine (both at 4.50). Coming in last in the research race was Buckinghamshire College of Higher Education (1.00). Some institutions chose not to submit certain departments for assessment, a decision that automatically made those departments ineligible for public funding but resulted in more respectable overall ratings.

Like eager undergraduates when final grades are posted, faculty and administrators rushed to read the assessment results and compare their grades. High ratings would not only attract greater funding but also draw more students.

As quality ratings bring in more money and better students, the rich will get richer, while the poor must get creative.

Assessment: “Enemy of Complacency”

The assessment and its results provoked considerable commentary, of course. The Association of University Teachers (AUT) called the ratings a “celebration of achievement, in that they showed an improvement over the 1989 results, despite a decrease in research funding.” AUT Acting General Secretary John Akker commented, “The success of higher education research in the UK, as shown by these ratings, should be a shining beacon to the government to give real support to research.”

An editorial in the London Times (Dec. 18, 1992) called the assessment system “harsh” but “better than the prejudices that have tended to govern perception of university performance,” noting that “regular public assessment is the enemy of complacency and banishes myth.”

A professor of education at Leeds University, Peter Scott—in a commentary written before his institution scored a 1.83—predicted “a ruthless stripping away of illusions.” Although admitting that the ratings are “perhaps ... a price that must be paid to keep Britain’s universities up to international scratch,” he warned of long-term consequences:

Real excellence evades assessment. It depends on a willingness to take big intellectual risks; research assessment rewards low-risk results. A more immediate danger is that the creative energies of universities will be devoted to research games rather than to research.

Once innovation was thought to begin in the laboratory and end in the factory. Today technology transfer, the commercialisation of research, product and service development are seen as creative activities in their own right.

Scott warned of “the risk ... that this week’s grades are the outcome of a process which, paradoxically, is impoverishing research as well as strengthening its funding base.”

The UK assessment procedure may be unique, but the financial crisis behind it is universal. Academics in the U.S. and Canada face declines in research funding and unsettling questions about allocations. Will they also face national assessments?

What do you think? Should the federal government conduct a research assessment of higher education? Send your thoughts to: Steven Kornuth, Professional Scholar, 2718 Dryden Drive, Madison, WI 53704-3086. PS

Language and the Teaching of Science

Indira M. Raman, University of Wisconsin-Madison

As a graduate student in neuroscience, I was recently a teaching assistant in an introductory neurobiology course. Remembering my initial difficulties in understanding the subject, I hoped that in presenting the material I might identify elements of teaching that enhanced or impeded communication. My attention was soon drawn to how professors, textbook authors, and I use technical language.

After having been in the field for a few years, I had grown accustomed to the words generally used to express sophisticated concepts. However, not until I was required to explain these ideas to undergraduates in a formal setting did I become conscious of the inconsistencies in jargon: multiple definitions are often assigned to the same word, and different aspects of a phenomenon may be described by several words, which, despite their nuances may be casually interchanged by specialists. That the language in a complex field should be complicated is not surprising, or even necessarily problematic.

The “inconsistencies,” as I call them, occur frequently at the most basic level of description and can confuse students early in a course. Two brief examples may illustrate this observation.

First, in neurobiology, we often use the word potential, much as physicists do, to refer to voltage. However, in certain cases, potential means the voltage at a particular instant (as in the technical term membrane potential), while in other cases potential signifies a voltage that changes over an extended period (as in synaptic potential). Thus, potential has a dual, conflicting meaning. Second, the terms receptor and receptor potential have distinct, virtually unrelated meanings. Although these observations may appear trivial, many students had difficulty grasping certain fundamental ideas largely because of the terminology.

Other professors with whom I later discussed these examples were as surprised as I was to discover the inconsistencies in our own jargon. It is unlikely that this disorder in language is confined to the field of neuroscience.

The individuals who continue to study a particular subject appear ultimately to clarify the terminology for themselves. Nevertheless, technical fields may become more accessible at the early stages if students are provided with opportunities to develop their skills with the new, specialized language. Therefore, during the semester I tried not only to remain sensitive to the language of science, but also
to emphasize and clarify linguistic conflicts in order to encourage students to communicate effectively.

Concepts vs. Details

In addition to analyzing the jargon of those of us teaching the course, I began to notice the language of the students. They often claimed (usually after an exam), "I knew the concepts — I just couldn't remember the details." To me, this dichotomization of concepts and details seemed inappropriate.

I discussed with my students the notion that, out of many related bits of information, or details, a general principle, or concept, may emerge. This concept, in turn, may be applicable or relevant to new sets of details, which then may modify or extend the initial concept.

That many students had not formalized this idea was reflected in their questions and answers. For instance, one student defined synaptic potential as "having something to do with voltage," and claimed to have grasped a concept. The students' garbled blend of jargon and the vernacular both amused and frustrated me, until I noticed my own role in perpetuating their disorganized thinking. In addition to using words with mixed definitions, I (and the professors and textbook authors) often used a linguistic shorthand to express various ideas.

For example, I found myself telling students, "Sodium ions want to enter the cell," instead of saying, "The concentration gradient and the electrical gradient are such that a strong force drives sodium into the cell." Unfortunately, it seemed long-winded or awkward to repeat basic principles in each sentence, and it was troublesome to find a balance between oversimplified shorthand and excessive description. I concluded that the shorthand might become appropriate after students had achieved a certain level of competence or intuition.

To me, intuition is a high level of facility or comfort with a language of a certain field of study. Thus, it enables one to identify relationships between established ideas and the implications of new pieces of information. In other words, it links concepts and details. This type of intuition is built on firm grounding in basic principles, which in turn is based upon a solid understanding of definitions. To try to help my students develop intuition, I found it useful to return again and again to the precise, formal meanings of words.

Focus on Language in the Classroom

In my experience, science courses have rarely emphasized verbal expression, either written or oral. Examinations are usually problem-solving or short-answer, and, considering the time constraints of an exam, graders are (justly?) inclined to overlook flawed grammar and approximate expression. Furthermore, because term papers are often due at the end of the semester, students have few occasions to rewrite their papers. Clearly, instructors have a limited amount of time to spend analyzing and critiquing students' written work.

It was impractical for me to work individually with each of the 100 students in the class. Nevertheless, in our weekly discussion sessions, I tried to address linguistic problems that occurred in students' problem sets or in their orally expressed questions.

For instance, we analyzed the way in which certain words may serve to distinguish between cause, effect and correlation, as in "treatment X produced change Y" vs. "change Y was observed, following treatment X." Also, we discussed why it was incorrect to say that calcium ions inside a cell were "degraded" instead of "bound" or "sequestered."

Many students seemed responsive to this overt discussion of language in the context of science. They became more willing to use technical terms and to phrase questions accurately. Several students voluntarily submitted drafts of their term papers. After discussing both content and expression with me, they rewrote the papers. The improvement was both considerable and gratifying.

It is, of course, reasonable to assert that a focus on language may be beneficial at much earlier stages of study, and in most subjects. However, instead of dwelling upon apparent inefficiencies in elementary, secondary, or even undergraduate education, I prefer to explore the efficacy of "bootstrapping," that is, starting to address an issue at any stage, in whatever context available. Because my class was in neurobiology, I used scientific jargon and the language of experimental science as a substrate for teaching the utility of accurate definitions and clear communication.

One could still argue that it is not the role of a science course to teach writing. Again, however, the issue is not simply one of teaching writing, but rather of developing the ability to think precisely.

Mastering the language of a field — the definitions of technical terms and the implications of certain styles of expression — is an integral part of learning a subject and cannot be relegated to general writing courses. At advanced levels, the way in which words are used in a field can reflect the state of knowledge as well as the extent of controversy.

Failure to cultivate sophisticated use and understanding of technical language may promote the streamlining of information into simplified and occasionally simplistic packets, thereby limiting our ability to manipulate details into concepts. Conversely, careful and precise use of terminology — and teaching this usage to beginners — can enhance our comprehension of issues that comprise conflicts that undoubtedly exist in most fields of research.}\n
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