FUNDAMENTAL ISSUES IN HONORS TEACHING: Data, Information, Knowledge, and Wisdom on the Wired Campus

LARRY CROCKETT

> The single most important distinction between honors and non-honors courses are the honors students: dedicated, motivated, fascinated students with solid foundations in prior work and with new and creative insights. They spark each other (and the professor) and learning takes on a whole new dimension.... The essence of honors programs, I believe, is putting gifted people in touch with one another (Donna Birdwell-Pheasant, 1997).

Since teaching is a performing art, it is easier to identify it when it is happening than it is to define it in the abstract. Any attempt to define a performing art abstractly eventually fails in the face of the fluid range of expression and exploration that constitute a performing art. Flights of the human spirit, it seems, resist capture in linguistic formula. If this is right, then honors teaching, *a fortiori*, is even more resistant to definition since it presumably involves a performing art practiced by the better prepared, the more committed and, often, the more gifted. Consequently, we are faced with the vexing question of whether it is even feasible to consider fundamental issues in honors teaching. Perhaps we should reluctantly agree with the most influential philosopher of the twentieth century, Ludwig Wittgenstein (1960, 7), who offered the enigmatic suggestion, "What we cannot speak about, we must pass over in silence."

Even if satisfactory definitions of honors teaching are likely to elude us, however, among all educators honors practitioners in particular should recognize the dialectical value of considered reflection on honors teaching. Clarity is not likely the starting point of such deliberations but perhaps may emerge – incompletely, tentatively, and often prematurely, to be sure – if we take the time to explore basic questions about what it is we are doing when we engage in honors teaching. Even the silentious Wittgenstein, we should remember, wrote two books.

This chapter will take up four specific issues related to fundamental issues in honors teaching. Part I will develop an epistemological taxonomy, what I call the DIKW hierarchy. "DIKW" is an acronym for "Data, Information, Knowledge, Wisdom," and I will argue that the DIKW hierarchy, which provides an Internet-aware epistemological taxonomy, is a helpful way to reach some clarity about honors teaching on what is increasingly becoming a wired campus.

Part II will consider some of the implications of the critical thinking movement, which has gained such currency over the last few years, for honors teaching. At first pass, honors students, of all students presumably, ought to be students who self-consciously practice critical thinking; they should be the more astute students who engage in thinking about thinking. I will use the DIKW hierarchy to explore what it means to think about thinking and what it means to assess issues and explore questions critically and reflectively in the age of computing.

Part III will explore aspects of the computing and communications revolution that is passing through collegiate campuses like a tidal wave. Discussions of technology, and the appropriate use of technology, dominate both paper and Web-based periodicals, and no discussion of honors teaching would be complete without consideration of this potent new phenomenon.

Part IV will conclude with an exploration of the intriguing yet vexing issue of how honors teaching differs from non-honors teaching. Honors programs have long labored with the issue of how to affirm the distinction between honors and non-honors pedagogy without appearing elitist and, pragmatically, offending faculty who might conclude that honors programs pilfer good students from non-honors courses. Honors pedagogy, as Birdwell-Pheasant suggests above, involves the establishment of a community of people who share commitments, capabilities and passions. In particular, the DIKW hierarchy and the computing revolution bring into relief the special calling that constitutes honors teaching today.

The DIKW Hierarchy

The computing and communications revolution, with the latter being even more important than the former, will inevitably shape discourse about honors pedagogy in the years ahead. Elizabeth Anne Viau (1995, 3), in "Technology and the Nature of Knowledge," frames a similar set of epistemological terms to what I have es-

poused for several years — though she does not use the term "DIKW hierarchy." The hierarchy consists, as mentioned above, of Data, Information, Knowledge and Wisdom. It is a hierarchy both epistemologically and normatively. Data, as we will see, are epistemologically shallow while the depths of wisdom resist empirical test. Normatively, the higher components, knowledge and wisdom, should comprise the heart of the academic enterprise while data and information might warrant only occasional attention.

Data consists of distinguishable marks on a page. A string of 1s and 0s, to use the obvious example, such as "100000110," uninterpreted, is simply marks on a page that could be interpreted any number of ways. Any other set of distinguishable marks, such as "<>>>><<>," would work just as well. Data in other words, consist of bits, which can, if we wish, be interpreted as something with greater meaning, such as a character. Binary data lends itself to rapid transmission and manipulation since bits map precisely onto electronic circuits, which use on/off switches. Raw data are comprised of 1s and 0s and are devoid of suggestion of how the 1s and 0s should be taken. If you have ever subjected yourself to the distinctly unpleasant screeches and pops of a modern transmission, you understand all too well the meaninglessness of raw data.

Information is one step up on the DIKW hierarchy because it is data augmented by an interpretation. For instance, "01000001" uninterpreted is simply data. It is not one more than one million since that presupposes a base-ten interpretation of the digits. Interpreted as an ASCII character, it is the binary representation of the letter "A". Information contains, as a result, both data and an interpretation that reflects some kind of intentional system, in this case, ASCII. Notice that no significant theoretical component is an ingredient in information; rather, it contains enough interpretation so that the data are more than distinguishable marks on a page. Strictly speaking, "1" is not the integer one unless it occurs in some kind of interpreted context, either explicit or implicit. That mark can just as easily be a character, for example, in the word "letter." Interpretation makes distinguishable marks into information. That the letter "A" is represented by the binary string "01000001" is not true by virtue of empirical discovery but by convention; the inventors of the ASCII code decided this was to be true. Notice that no ambiguity attaches to information that is true by convention. This means that computers are well suited to manipulate information because information is ambiguous and theoretically inert.

Knowledge typically includes information but also includes ingredients such as theoretical constructs and some kind of warrant between the world and propositions expressing claims about the world. A widely accepted philosophical definition in the twentieth century was that knowledge is "justified true belief." While this pithy definition is in its inevitable decline, epistemological issues, especially those associated with science, have dominated philosophy in the last three centuries, edging out ethics and the classical "love of wisdom." Knowledge about the world is never certain since it is always corrigible in the face of new evidence or developing consensus in a practicing scientific community. Born as it is in a cauldron of method, politics and social consensus, knowledge is a significant jump up the DIKW hierarchy.

Wisdom is knowledge plus ingredients that resist easy characterization but typically are based in the long experience of communities. With the Enlightenment, Western philosophy largely abandoned discussions of wisdom. But the East has long prized the pragmatic virtues, and there are fresh signs that Western philosophers are returning to their roots in the Socratic pursuit of wisdom. People have capacities, abilities and dispositions that require cultivation; cognition is more affective than prepositional since our brains embody eons of quick choices successfully made in complex environments. Capacities, capabilities and powers require sustained cultivation in tradition-rich communities before we can discern, think, love and navigate complex situations that defeat the most sophisticated algorithmic approaches. Wisdom, therefore, is the pinnacle of the DIKW hierarchy.

Notably, knowledge claims lend themselves to empirical test over shorter periods of time while wisdom, to the limited extent it can be propositionally articulated at all, is tested only in longer historical time frames as social and cultural structures propagate or fail to propagate. At this juncture in history, we often place knowledge claims that are amenable to test in shorter time frames in the domain of science while the precepts of wisdom fall more naturally in the domains of ethics, philosophy, literature and religion.

Critical Thinking and the DIKW Hierarchy

Philosopher Bruce Reichenbach (1998, 29) offers surprisingly pragmatic definitions and explorations of what it means to think critically. He labels it "nexus or group of interconnected skills." Such skills include the ability to clarify the ambiguous, to make infer-

ences from evidence to conclusion, and to employ effective strategies since critical thinking is a "goal-oriented skill." Such skills are interrelated and not readily distinguished, bound up as they are with a range of human faculties. Moreover, since critical thinking involves skills, a student becomes better at it with practice. Michael Jordan practiced his basketball skills, which involve critical thinking as Reichenbach understands it, so the critical thinker must practice and exercise, as it were, the muscles of critical thought.

Reichenbach also suggests that critical thinking involves *dispositions* as well as skills. Such dispositions include curiosity, the ability to persist in the pursuit of goals, open-mindedness, and, perhaps most importantly, implicit skepticisms about the claims people make. Effective critical thinkers intuit the limitations inherent in our ability to understand the world and, therefore, appreciate the "role of personal judgment in the knowing process."

In DIKW terms, what does it mean to engage in critical thinking? First, it means an appreciation for the differences in the levels themselves. Information is more than data and knowledge is equivalent to neither information nor wisdom. Information is not just lots of data, and information requires an epistemologically complex ingredient, namely theory, in order to become knowledge. Phone books are information-rich and knowledge-poor while books of John Donne's poetry and sermons are rich in wisdom and subtle understanding of the human condition. Consequently, we rightly recycle the former but cherish the latter. Donne's work is not so much information-poor as it is information-indifferent.

Second, the honors classroom, arguably more than non-honors classrooms, should be most exercised by the KW part of the hierarchy. All but a few facts – to the extent that they involve only information or uncontested assertions such as "water weighs more than 8 pounds a gallon" – are unsurprising, mundane, and, therefore, are unworthy of our deliberations. There is no *philodata or philoinformation* but *philosophia* is the heart of the academy's pursuit; the heart of the academy is where we ought to find honors students clustered in spirited debate of overarching issues that are a little oblivious to facts.

How should the honors enterprise be shaped by critical thinking in DIKW terms? Since I am fond of saying, "rules, schmules," I am not enamored of the formulaic approach to critical thinking – the only rule seems to be that, finally, there are no eternal rules. Nonetheless, I like to underscore some tools and practices that can act as catalysts as we attempt to think critically. First, we're in an

age of science and, despite the fact that honors teaching will concern itself most with the KW part of the DIKW hierarchy, evidence will still find a place in academic work. It might be textual evidence, it might be an image of a vibrating atom, or it might be the results of a political poll; but if our claims about the world are to be corrigibly effective, we will have to traffic in appeals to evidence. Not all facts are evidence since "evidence" is a theory-laden term. So we do not descend very far down into the DI area even here.

Second, despite the fact that most logic texts warn against appeals to authority, much of scholarly work will consist of appeals to work done by respected scholars. Those appeals will, of course, not be uncritical appeals since the work of the most distinguished scholar is just as open to challenge as that of a first-term freshman. But much as it is impossible for a person to do quantum mechanical experiments in experimental isolation, it is impossible for one person to do academic work in intellectual isolation. Academic work is inexorably social, if only in an intellectual sense.

Third, informal and formal logic can be helpful at times. The world is far more subtle and slippery than any logical system, of course, but occasionally, for example, we can be faced with two candidate explanations of a phenomenon. A steady stream of evidence against one candidate explanation counts as evidence for the alternative: if either a or b, and evidently not a, then therefore b, logic tells us. The relationship of evidence to conclusions, as suggested above, is subtle and slippery – but a little logic can be a good thing.

Fourth, since academics is applied dialectic, critical thinkers should anticipate objections to their own point of view. To render the outdated metaphor in computational terms, we ought to avoid setting up "straw robots" that are easily knocked over. Underdetermination means that knowledge (empirical claims) and wisdom issues never admit of proof, but consensus, from time to time, will emerge as we advance points of view and anticipate objections expressed in their strongest form. In the honors critical mass that Birdwell-Pheasant described in the quotation that began this paper, such dialectic should be particularly intense and, therefore, productive.

Fifth, honors students should be in the business of scouring the conceptual landscape for sustainable distinctions. The critical thinker is always on the lookout for distinctions, which can help our language to map onto a subtle, slippery world more adequately. A good distinction can bring clarity to an argument, which an inad-

equate terminology would hopelessly muddle. At times I am inclined to oversimplify and say that "the academic game is the distinction game" and, while this is too simple, it captures a surprising amount of academic truth. Drawing distinctions is a conceptual activity deep in the KW part of the DIKW hierarchy (Crockett, 1997).

In sum, critical thinking has occupied center stage recently in many discussions of education, both K-12 and collegiate education. Critical thinking in an honors context means self-conscious immersion in the KW part of the DIKW hierarchy and an unapologetic, Moynihanian "benign neglect" of the DI part. Even if housed in a state-of-the-art honors lab, as is the case with the honors program at Augsburg College, honors program pedagogy inevitably sees *techne* as a means to *philosophia* and never as an end in itself. As we will see in the next section, that is becoming a much taller order with the emerging computing and communications revolution.

The Computing Revolution and the DIKW Hierarchy

Two misconceptions are often expressed in the face of the emerging computing and communications revolution. The first misconception supposes that computers and networks are so capable that they will replace us at some point. This is the "we'll be lucky if they keep us around as pets" view. The second takes the opposite tack and claims that computers are impressive tools but are tools nonetheless. Tools never replace skilled members of any kind of guild so, on this view, too much is being made of the "computing and communications revolution."

Taking the second misconception first, the view that computers are "tools" or that "computers do simply what we tell them to do" is too simple since it is on a par with "people are determined by their genes and therefore are not free." To dismiss computers as "tools" is to miss the fact that computers (or machines driven by computers) are software driven. Software is fluid, flexible and malleable in a way that machines and tools are not; to use tool-talk in the same breath with "software" is to fail to appreciate that a difference of degree has become a difference of kind. Something quite new is happening with computing such that nineteenth-century machine conceptions are misleading. If someone can build a hammer that can, on command, morph into a radial arm saw when you need to cut a board, then into a 21-speed bicycle when you want to tour the foothills, then I will agree that tool-talk is appropriate.

What is unique about computers is that the "tool" they are at any given moment is a function of the software that is driving them. What is significant about computers is not what you can touch but what you cannot touch, the software. "Computer science," therefore, should be called "software science."

For all this unprecedented flexibility, and to illustrate why we ought not take the "we'll be lucky if they keep us as pets" view seriously, computers are good at manipulating the first two levels of the DIKW hierarchy but fare badly, at least to date, at higher levels. Of course, this claim turns on the current state of artificial intelligence, which has made little substantive progress in recent years. More exactly, computers are good at information storage, transmission and transformation, but have shown little facility for the development of theories or the cultivation of wisdom. In a word, they are not critical thinkers and their forte is DI, not KW (Dreyfus and Dreyfus, 1986).

A good way to illustrate where we are currently if we hope to know how far up the hierarchy computing can take us, consider the sexy little idea of a *knowbot* or *infobot* (http://www.hypernews.org/liberte/computing/agents.html) There has been much talk about knowbots in recent years in a variety of places, from *Scientific American* to *Popular Science.* Knowbots are software agents that roam the Internet and other systems, looking for information, services and software that would interest the knowbot's owner.

But as we ascend the DIKW hierarchy up into the knowledge that a *know*-bot would presumably need, computing appears destined to be much less helpful. Knowbots are software agents, it is claimed, with some smarts. Another way to understand this is to see knowbots as perched somewhere between information and knowledge on the DIKW hierarchy. The problem that a knowbot faces is the attempt to encode a measure of judgment about human interests and activities. This presupposes some understanding on the part of the knowbot. Barring a solution to a number of perennial problems in artificial intelligence, most notably the *frame problem,* however, there does not seem to be much reason to hope that genuinely helpful knowbots will be feasible (Crockett, 1994). Understanding human issues, bound up as they are with human history, language and folklore, presupposes a flexibility that software simply has not displayed so far. As a result, there is insufficient reason to conclude that knowbots will prove pivotal to our use of computing for KW tasks as some imagine.

Here's the relevant question: what will our much vaunted computing prowess do for us in terms of increasing our knowledge and wisdom? I think the answer is mixed in the following way. Computing will facilitate our acquisition of knowledge and wisdom primarily indirectly and not as much directly as might have been hoped earlier in the twentieth century, when artificial intelligence emerged in the first euphoria over the invention of the digital computer.

The claim made here is that computing, largely or completely restricted as it seems to be to the first two levels of the DIKW hierarchy, will not do much directly for us in the formation and assessment of knowledge and wisdom claims. Theory formation and assessment, in other words, appear not to be computable functions. On the other hand, in terms of the remarkable data storage, transmission and transformation capabilities of computers, communications will play an extraordinary role indirectly enhancing our exploration of the world and the generation of at least some knowledge and some wisdom. A Net-savvy philosopher or sociologist in the making, for instance, will find exceptional resources that can be screened in powerful ways using some of the advanced search facilities of the major Internet search engines such as Hotbot Supersearch (http://hotbot.com/?SM&MCT=super.x= 161&super.y=9). Let me put it directly. I believe the dynamically linked web page will replace the conventionally published academic paper, and I am convinced that web pages and their sundry "plug-ins," such as streaming audio and video, in terms of sheer bandwidth, will become the primary means of human communication in the future. Third-millennium sensibility will be wired sensibility with, in principle, complete access to every idea, every experience and every viewpoint. As Negroponte (1995) is given to saying, "space is abolished." If it is important or deemed important it will be on the Net. Our ideas of "published" will change dramatically; it will no longer mean widely accessible but will have to do with being juried and accepted by a recognized web publisher. In a word, it is the fiber-linked, dynamic network, providing real-time access to whatever is linked to the network that will shape the pedagogical enterprise in the future, not artificially intelligent computers.

What will it mean to have, in principle, full access to galaxies of information and every idea, every experience and every viewpoint? This networked cacophony will in some ways be the new "vast wasteland," to use the term that was applied to broadcast television some years ago. Epistemologically, it will tend to push

us down the DIKW hierarchy, to flatten the hierarchy in the direction for DI. Particularly if we rely on knowbots and spiders, whose capabilities may prove inexorably tied to DI-manipulation, to do our searching, the act of selecting what to attend to, perhaps the most critical of the liberal arts judgments, will be rendered a DI-computable judgment. With Net content growing at 10% a month, we will, to some extent, have to rely on this KW-challenged software. The great appeal of the Net is prodigious access; the great danger is degradation of philosophical sensibility. Plato's dialogues and the Buddha's "Sermon at Benares" are easily obtained by a knowbot but they manipulate bits in a world which tends to view all bits to be equal in value. If space is abolished, then epistemic geography is flattened and a sense of history is dragooned into a multimedia present. As a result, it will be much more difficult to get our bearings and make perceptive judgments.

How Does Honors Teaching Differ from Non-Honors Teaching?

Honors teaching on the wired campus of the twenty-first century must heed Birdwell-Pheasant's call to see honors teaching as "putting gifted people in touch with one another." Putting gifted people in touch with one another means a specific call to resist the computational culture's natural tendency to push us pedagogically down the DIKW hierarchy (Postman 1992). As a professor of computer science, admittedly, I am greatly enamored of the computing and communications revolution and welcome its arrival on the college campus; the four phone lines into my house, the six computers that populate my house (a 1.5 computer-to-person ratio), and our two Internet accounts that are active many hours a day underscore this digital dalliance. Yet as Director of the Honors Program at my institution, and with a graduate degree in philosophy, I worry that the fiber optic lines, the packet-switching technology and the streaming audio will jeopardize the great philosophical traditions. It is surely a Faustian bargain to trade Milton's *Paradise Lost* for a Java-enabled browser if playing with the browser means a promising young scholar never gets around to deep study of the exceptional text. To recast Milton's most famous line, some DI-enamored technophiles might be pushed into behaving as if "it is better to rule the bits than serve the ideas."

Honors teaching in this new computational environment has a special calling as never before. Honors teaching is critical mass teaching with students who are prepared and committed to assess-

ing all phenomena critically, in light of the greatest insights and greatest voices the academy has come to cherish. Critical thinking is not just an activity, a useful craft; it is *vocatio* for the honors enterprise. Archbishop Lefevre, the anti-Vatican II archconservative, once observed that "our future is the past." This tidy little maxim is a theological *reductio ad absurdam,* of course, but it is perhaps a useful corrective in our time-flattened Internet age. One need not be a theological reactionary or a technological Luddite to insist that critical thinking – and, therefore, honors teaching – must entail a conversation that traverses both the centuries and the cultures.

Theodore Roszak (1986, 87) argues: "No matter how fast information is sent, packets of information are never the substance of thought." We do not generalize from information to ideas, he reminds us; rather ideas emerge from the play of the human imagination in the vagaries of human history and relationship. In terms congenial with the DIKW scheme I have advanced here, he draws a distinction between *ideas* and *master ideas.* Ideas have a closer relationship to data and information than master ideas, as Roszak (91) sees it, because the latter *"are based on no information whatsoever."* We have the facility, occasionally, of generating master ideas that are far more than extrapolations from experience. Instead, they originate in the free-ranging human imagination, and they are at the heart of what makes us both human and potentially humane. We are at our best when we immerse ourselves in spirited conversation about master ideas.

Master ideas are not derivable only from sense experience. They are neither testable by science nor computable in software. Instead, with Roszak's master ideas, we are in the domain of civilizational and cultural wisdom. Master ideas shape how we perceive the world; as we immerse ourselves in them, they literally shape the synaptic organization of our brains so that we inhabit a different world. Master ideas shape our construction of the valuable, our deliberations about the ethical and even our identification of the factual. At this level, the top of the DIKW hierarchy, where we can freely engage in Socratic dialectic about knowledge and wisdom, we find our noblest calling. Honors teaching, since it presupposes students who not only are able to assess critically master ideas but have a romantic commitment to them, involves precisely this dialectical immersion in master ideas.

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