

THINKING BIG: A Conceptual Framework for the Study of Everything

BY MARION BRADY

BUCKMINSTER Fuller once said, “American education has developed in such a way it will be the undoing of the society.” Reading those words today, many may nod in agreement. Few, however, are likely to give the same reason as Fuller did for so bleak a prediction.

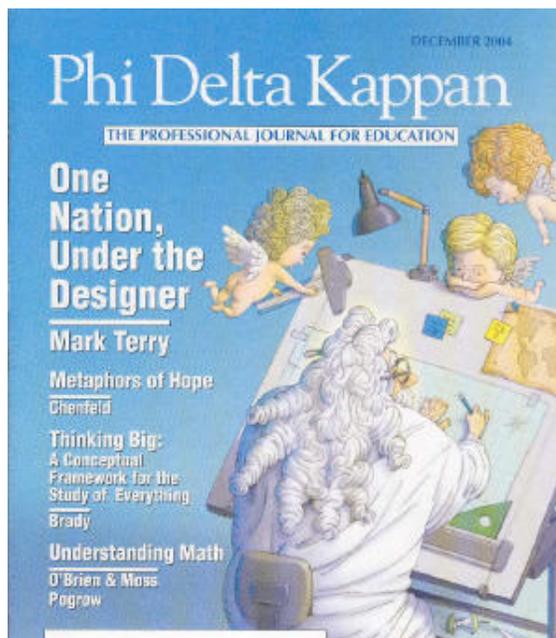
Fuller is most frequently remembered as the inventor of the geodesic dome – the lightest, strongest, most cost-effective enclosing structure ever devised. He was an inventive genius, but he was also a college professor, cartographer, philosopher, naval officer, mathematician, poet, researcher, cosmologist, industrialist, engineer, environmentalist, advisor to business and government, holder of 25 patents, author of 28 books, and recipient of 47 honorary degrees.

He aired his views on American education, including the judgment I quoted above, in the late 1980s in a speech delivered to a group that included college presidents. “What you fellows in the universities do,” he continued, “is make all the bright students into experts in something. That has some usefulness, but the trouble is it leaves the ones with mediocre minds and the dunderheads to become generalists who must serve as college presidents. . . and presidents of the United States.”¹

Generalists – people who strive to see the “big picture” – don’t get much respect in America. There is no listing for “Generalists” in the Yellow Pages, no places are reserved for them on the faculties of high schools and colleges, and no employment ads seek applications from them.

And what is the big picture today? Intensifying clashes on the “fault lines” between religions, societies, and civilizations; continuing threats of terrorism; a shrinking middle class and a widening gap between rich and poor; the confusing of national power with national greatness; dishonesty in boardrooms; violence accepted as entertainment; vast wealth plowed into no-return-on-investment armament and conflict; increasing environmental degradation; lobbyist-dominated legislatures; unwarranted confidence in the world-improving ability of force; official tolerance of tax evasion and a general decline in a sense of civic responsibility; and an education system beset by ideologically driven policies.

These related, big-picture issues are parts of a systemically integrated whole – a whole that the education establishment is not addressing. We send our graduates off with expertise in



technology, banking, politics, medicine, law, and myriad other fields, staking our collective fate on their ability to manage crises as they pop up. But the old problems intensify and are joined by new ones.

That the education system we have created might, as Fuller said, actually be a major *cause* of those intensifying problems does not seem to have occurred to us. I can find little evidence of serious, ongoing dialogue among policy makers about the wisdom of continuing to educate students narrowly. Neither can I find evidence of concern about potential societal chaos when millions of narrowly educated experts pursue their professions with little or no understanding of how their actions interact.

Most of the college presidents and policy makers on the receiving end of Fuller's blunt accusation probably went back to their respective institutions and did nothing. Those few who actually undertook instructional program changes probably played with course distribution requirements; organized or expanded interdisciplinary programs; focused instruction on projects, social problems, or themes; put a "capstone" course, in place; or tried to skirt the issue by emphasizing "process" rather than "content."

None of these actions do the job that needs doing. All these approaches to broadening students' ability to deal with reality assume that the traditional academic disciplines are the basic organizers of knowledge and that the main task of educating is to introduce those disciplines to students. Wrong. The main task of educating is to help students make more sense of the world, themselves, and others.

Most educators no doubt share that aim and can provide myriad examples of their favorite discipline's contribution to broad understanding. But that misses the point. The problem is not the failure of biology, economics, chemistry, psychology; and other school subjects to expand our understanding of reality. The problem is the failure of schooling to pull these disparate pieces together to address questions that few students articulate but that all, at some level, ask: What's going on here? How did it come to be? How could it be different? How might I alter it?

For answers to questions like these, the disciplines are too narrow. They can be brought to bear on human experience, but neither individually nor collectively do they provide a coherent, holistic, comprehensive, hard-edged, and intellectually manageable conceptual framework that students can use to make more sense of daily life. The disciplines have different aims. They ignore much knowledge of great significance. Their vocabularies are arcane and often incompatible. Their methodologies are distinctive. They operate on different levels of generality and abstraction. They have long histories of competing for students and resources. Their practitioners have little interest in integrating and rarely even talk across disciplinary boundaries. Their support systems – bureaucracies, professional organizations, periodicals, funding sources, and so on - would oppose consolidation. Indeed, the trend is in the other direction: toward ever greater fragmentation as disciplines split and split again into subdisciplines.

Up to a point, all of this is a good thing, for it is one way in which knowledge expands. But it is not the *only* way, and it is certainly not the way to build a comprehensive, intellectually manageable conceptual framework for organizing general education. What students need is a "master" organizer – a mental filing system or map they understand – that displays the general

layout of the mind and its system for integrating knowledge. That organizer will recognize, encompass, and relate the disciplines, but it will not be fashioned from them.

AN ALTERNATIVE ORGANIZER OF KNOWLEDGE

Anthropology. Botany; Chemistry. Demography. Economics. Geography. History. Language. Physics. Sociology. Zoology. We take the compartmentalization of knowledge for granted. So deeply ingrained is the idea that knowledge is best transmitted to the next generation in neat, discrete packages, that we can hardly imagine schooling organized in any other way.

This is a recent and curious assumption. Throughout recorded history, long before the academic disciplines took shape, great, noncompartmentalized minds were at work in ways still admired. We may retroactively place Socrates, Jesus, Leonardo, Galileo, Benjamin' Franklin, de Tocqueville, and hundreds of other respected thinkers within today's disciplinary categories, but that is not how they saw themselves. Indeed, if most of the great minds of the past had been forced to function within the arbitrary boundaries of our narrow academic disciplines, we might never have heard of them.

Nearer at hand and hardly less impressive examples of noncompartmentalized thinking are the intellectual accomplishments of small children. Their formal introduction to school subjects lies years in the future, and yet, starting in infancy, they learn to organize and integrate knowledge in situations whose complexity we fail to appreciate only because the situations are so familiar.

But for perhaps the most convincing evidence that complex thought processes can be independent of the disciplines, try introspection. Your moment-by-moment functioning requires you to continuously select, organize, and integrate enormous amounts of information. You do not do that by mentally moving between the various academic disciplines. You use a different, far, more sophisticated, seamless approach.

We have created a way of life that makes discipline-based, specialized study essential. But for general education – for the task of managing our individual and collective affairs and exercising some control over the future – fragmented, specialized studies are not enough. There needs to be in place an overarching framework enclosing the disciplines, expanding them, filling the gaps between them, putting what appears to be random information in context, providing perspective, setting priorities, displaying the whole that the disciplines illumine in part.

Scholars have always insisted that the familiar curriculum of separate subjects is unacceptable. Daniel Tanner of Rutgers University put it this way: “All of our experience should have made it clear by now that faculty and students will not derive from a list of disjointed courses a coherent curriculum revealing the necessary interdependence of knowledge.”²

The University of Washington's John Goodlad said: “The division into subjects and periods encourages a segmented rather than an integrated view of knowledge. Consequently, what students are asked to relate to in schooling becomes increasingly artificial, cut off from the human experiences subject matter is supposed to reflect.”³

And Stanford University's Paul DeHart Hurd phrased it: “Beyond tradition there are neither philosophical nor psychological grounds for compartmentalizing knowledge into islands

of information that are presumed to represent academic disciplines as school subjects are currently conceived.”⁴

We have used the regularities and relationships we see in various parts of reality to create the academic disciplines. We should now use the larger regularities and relationships in reality to integrate disciplines, subjects, courses, topics, themes, social problems, projects, and other approaches to organizing instruction.

We all have a deeply embedded, probably hard-wired, system for “thinking big.” If that system is not hardwired, it is certainly a cultural regularity with too much instructional potential to ignore, for it is a key to solving a fundamental curricular problem.

OUR ‘NATURAL’ ORGANIZER OF KNOWLEDGE

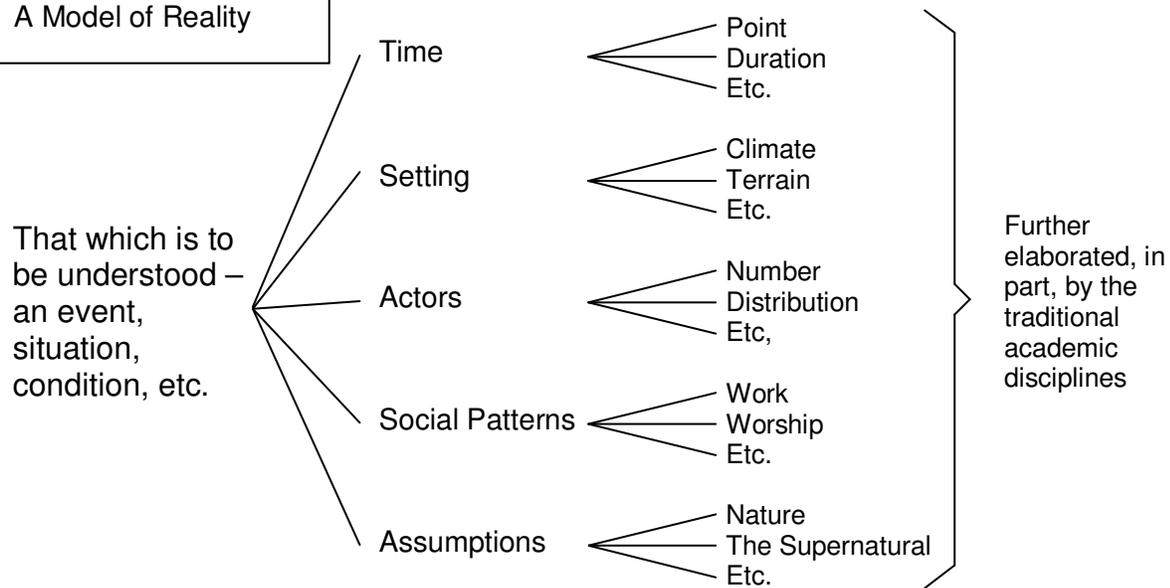
It is reasonable to suppose that a knowledge-organizing and integrating system used by everybody, every day, will be neither esoteric nor inaccessible. And indeed it is not.

Years ago, convinced of this fact, I began asking students to engage in a very simple activity designed to help them make explicit their implicitly understood system for organizing knowledge. I put them in small groups, told them to think about “an ordinary bit of reality – this room, right now,” and instructed them to write down as many facts about it as they could manage in five minutes. That done, I asked them to combine their lists and devise a system of categories and subcategories.

I have done this exercise with students from early adolescence through adulthood. Without fail, a five-part category system similar to that shown in Figure 1 eventually emerges as the major organizer. To make sense of experience – an event, situation, or condition – we set it off from other experience and lay our five-element template over it. We locate it in time and physical space, identify the participating actors, and examine social patterns and assumptions that influence it. These five concepts are the basic organizers of our mental models of reality. All knowledge “fits” within their collective boundaries. The traditional academic disciplines elaborate and explore random conceptual branchings of the five, but *only familiarity with the systemically integrated roots from which those conceptual branchings spring enables students to capitalize on their near-infinite relational possibilities*. This, not interdisciplinarity, is the key to the integration of everything the student knows.

There can be no acceptable general education without a discipline of general education, and there can be no coherent general education discipline without a framework of ‘logically related organizing ideas. The scheme in Figure 1 or a conceptual framework very much like it is the foundation on which a general education curriculum can be built. It encompasses all knowledge. Unlike the disciplines, its five elements relate systemically. It calls attention to currently neglected areas of study and to future possibilities. It provides criteria for content selection and emphasis. It makes clear the mutually reinforcing nature of the traditional academic disciplines (but also their conceptual randomness). It is an extraordinary aid to memory. It facilitates the expansion of knowledge by helping students envision possible relationships between various aspects of reality. It automatically adjusts to student ability. Being conceptual rather than factual, it constantly adapts to change. Not inconsequentially, it raises the level of sophistication of the curriculum beyond the easy reach of well-meaning but ill-informed politicians and other education policy makers.

FIGURE 1.
A Model of Reality



Moreover, this knowledge-organizing and integrating system does not even have to be taught. It is in constant use by every student. An instructor’s job is merely to raise it in the students’ consciousness from that which is implicitly known to that which is explicitly known. When students move from knowing to knowing what they know, they are able to perform at intellectual levels far beyond expectations.

TWO THEORIES

The present curriculum, made up as it is of separate, specialized studies, exerts considerable pressure on teachers to make major use of what could be called “Theory T.” Theory T dominates American education. It reflects the conventional wisdom about educating, underlies much of the education-related legislation handed down by federal and state governments, drives the current top-down “standards and accountability” fad, gives the publishers of textbooks and standardized tests a central role in the making of education policy, and is demonstrated daily in hundreds of thousands of classrooms – public, private, charter, parochial, and virtual – as well as home school settings.

T stands for “transfer.” Those who accept Theory T believe that knowledge is located in teachers’ heads, textbooks, reference materials, and on the Internet and that the instructional challenge is to transfer it from these locations into the empty space in students’ heads.

The degree of success of the transfer process can be measured with relative ease, which helps explain its broad appeal. At some agreed-upon interval after instruction – usually a few weeks or months – students are asked to recall what they have learned or at least to recognize a correct version of it when it is placed alongside other reasonable-sounding but false statements. Evaluating performance is simple enough to allow student responses to be scored by a machine.

In the traditional curriculum, the paraphernalia of the specialized disciplines encourages the use of Theory T. Each field has its own vocabulary, conceptual framework, methodologies,

and so on. These must be mastered, at least to some degree, before the discipline can be used as a tool to make sense of the world. Since students are required to work with several disciplines at once, even gaining a minimal familiarity with them leaves little time for the kind of real-world applications that lead to a useful level of understanding. However, when students need only master a single conceptual framework for the whole of reality, and when that framework is the one they are already using, they can immediately put the discipline to work.

Some educators – certainly a minority – reject Theory T, subscribing instead to what might be called “Theory R” Socrates appears to have been among their number, although it is unlikely that all those who admire his teaching style buy its underlying premise.

Theory R and our five-element model of reality are highly compatible. Theory R assumes not that students’ heads are empty but that they are full. The primary instructional challenge, then, is not to transfer new knowledge but to help students *reorganize* existing knowledge to make it more useful, consistent, or true and to supplement it with insights and skills that will help explain more fully what they already know.

This rearranging process is complex, but far less so for students in Theory R than in Theory T classrooms. Students in Theory T classrooms are passive absorbers of information. Students in Theory R classrooms must be active processors of information. Theory T emphasizes recall; Theory R requires students to engage in every known thought process. Theory T feedback to teachers and peers is simple and straightforward, coming in the form of either correct or incorrect responses. Theory R feedback is often subtle and difficult to analyze, coming in the form of body language, dialogue, and other indicators from which student thought processes must be inferred.

Theory R requires students to make connections, to perceive relationships, and to synthesize ideas. It sends students searching the far corners of their minds without regard for the artificial, arbitrary boundaries imposed by academic disciplines. Therein, incidentally, lies a major and perhaps unexpected benefit of having in place a conceptual map like the one in Figure 1. As any attempt to remember today the details of what we once learned in school will demonstrate, the human brain is very poorly equipped to store and retrieve random information. Memory needs the help of logic, and logic requires the use of a system of organization.

To illustrate that general education deals with the kind of content and skills that Buckminster Fuller promoted, let me share an example of an assignment for middle or high school students. It can properly be called “general” because it deals with matters of potential significance for life as it is lived, requires the use of a full range of thought processes, and touches on matters that do not fit neatly into existing subjects or courses.

One of the many matters that has probably gotten less attention in your education thus far than it deserves has to do with why and how the world changes and the nature of the future. Here are several events, ideas, innovations, or policies that could have consequences beyond those which are immediately apparent. Choose one, and construct a flow chart showing its probable or possible consequences over time. Extend the chart at least to a point at which a valued local way of acting and/or thinking begins to be threatened.

- a. A 3° Celsius increase in average annual temperature.
- b. A five-gallon-a-day limit per individual on fresh water consumption.

- c. A \$10 VSA (Voice Stress Analyzer), portable, about the size of a pack of cigarettes. (Voice stress analyzers indicate by a light or another kind of signal when a speaker is probably lying. They work directly or by telephone, radio, or television.)
- d. An antipollution law prohibiting the use of automobiles for commutes of less than one mile for all able-bodied persons.
- e. A mandatory year of public service at age 18 or after completion of high school.
- f. A heavy tax on automobiles, calculated according to the number of square feet or meters of road surface occupied.
- g. Zoning regulations that encourage a return to the colonial-era arrangement of combined living and working spaces in urban areas.

Students in Theory T classrooms would not expect this assignment unless each of the items had been “covered” in class. However, students familiar with a conceptual framework for organizing and integrating knowledge would consider the assignment perfectly reasonable, even if the items had never been mentioned in class. They would simply lay their five-element-model-of-reality template over the chosen item and begin to generate hypotheses about probable and possible causal relationships suggested by the template’s myriad “files and subfiles.”

The breadth of a true general education discipline and the specificity of the elements of such a discipline make it easy to endlessly generate instructional activities that even the most skeptical or jaded student will see as undeniably relevant and that all students, even the most brilliant, will find intellectually challenging.

WHAT SHOULD WE DO?

If Buckminster Fuller were alive today, he would surely accelerate his timetable for “the undoing of [American] society.” Today’s major education-related debates – about vouchers, choice, competition, merit pay, rewards, school shaming, discipline-based standards, high-stakes tests, accountability, privatization – do not even hint at the problem to which he was calling attention. No major participant in those debates is raising a single question about the aims of education, its proper scope, the validity or relative importance of particular standards, or the deeper meanings of “quality.” It is being assumed, wrongly; that the institution is basically sound, that it merely needs a tune-up, which can be provided by the play of market forces.

But bringing market forces to bear will not improve education. Indeed, present federally mandated “reforms” will do just the opposite; they will freeze even more rigidly in place the very curriculum – aimless and fragmented – that prompted Fuller’s warning. *The mandates attempt to force teachers and students to do the wrong thing better.*

For proof, one need only look at the so-called standards and the high-stakes tests being used to measure progress toward meeting those standards. Knowledge is “all of a piece.” Humans learn seamlessly. But the thousands of standards being put in place ignore this fact. Those who wrote them for various subjects obviously did not talk to one another, much less recognize the systemically integrated, mutually supportive nature of knowledge. The result is the perpetuation of an intellectually unmanageable, “mile wide and inch deep,” artificially compartmentalized curriculum, a curriculum acceptable not because it is theoretically sound, not

because it is intellectually challenging, not because it meets individual or societal needs, but because its familiarity blocks recognition of its fundamental inadequacy.

Public education is imploding, at a rate accelerated by the reactionary education legislation coming from various levels of government. Even the best schools are squandering their students' potential at a prodigious rate. It is far past time for leaders – principals, superintendents, college presidents, union officials, school board members, trustees – to realize that *they* must act, that teachers, curriculum coordinators, department heads, and others traditionally in charge of deciding what is taught are ill equipped by background, training, job description, and inclination to think about the whole of which their narrow areas of expertise are parts.

True leaders will hammer federal and state legislators until the innovation-stifling provisions of present legislation are repealed. They will then work with their faculties and other stakeholders to create a true *general* education curriculum, a curriculum that respects human nature and the brain's holistic approach to making sense of experience.

Buckminster Fuller was dead right. American education has developed in a way that, left unchanged, *will* be the undoing of the society. But even educators and policy makers who do not accept Fuller's bleak prediction are not off the hook. Schools are in the knowledge business. Any school that does not send its graduates off with a thorough understanding of the seamless, systemic nature of knowledge – and the ability to use that understanding to live life more fully and intelligently – is failing.

1. Quoted by John A. Howard in "Higher Education and a Civilization in Trouble," *Officer Review*, March 1989, p. 5.

2. Daniel Tanner, "The American High School at the Crossroads," *Educational Leadership*, March 1984, p. 10.

3. John I. Goodlad, *A Place Called School* (New York: McGraw-Hill, 1984), p.266.

4. Paul DeHart Hurd, "A Life Science Core for Early Adolescents," *Middle School Journal*, vol. 20, 1989, p. 22.

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