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Editorial

On a New Vision of Science and Science Education

Over the past decade, educators have focused with increasing urgency on science education. As our knowledge of the world expands, and as our technologies become more sophisticated, the requirements for and of scientific literacy grow geometrically. At the same time, our conceptions of science itself are in transition. Positivism, still the vogue in a variety of research areas, is yielding at the frontiers of science to paradigms that defy empirical circumscription. In this context, the teaching of science requires not only the transmission of particular facts or theories but more so an initiation into the modes of perception and conception that underlie scientific inquiry. How might we encourage students to approach scientific study with an openness to what is — to go beyond problem solving — to develop creative, even aesthetic, insight?

Some particularly promising models of science have been described by such philosopher/scientists as Gregory Bateson, Michael Polanyi, David Bohm, and Rudolf Steiner. Their insights have not only led to discoveries in their respective fields, but also opened new possibilities for the advancement of science as a means of understanding. Each of them, with unique perspective, suggests a scientific paradigm that balances explicit observation with implicit order, intellection with imagination, analysis with synthesis, and public discourse with personal knowledge. Bateson speaks of the “aesthetic” of knowing that allows for exploration of the “pattern which connects.” Polanyi describes the search for the “rationality of nature” and the “tacit dimension” of human thinking that can lead to discovery. Bohm elaborates an “implicate order” that requires a grasp of “wholeness” beyond the observed. Steiner details levels of being that may be apprehended by heightened intuition.

Through the work of these and other philoso-

phers and scientists, a postcritical model of science is emerging — a model of science that mirrors in the tacit, personal insights of the scientist, the principles that both shape and transcend empirical observation. This postcritical model of science views empirical information as clues to laws, governing principles, or deeper aspects of reality rather than as the objective limits of knowledge. It views scientific theory as both the expression and a source of personal insight — insight achieved only by an imagination that can grasp what is implicit beyond the explicit. Just as Einstein rejected the Newtonian assumption that the universe is created of distinct particles, so the postcritical model of science rejects the positivistic notion that science consists of explicit statements logically derived from and relating solely to specific empirical observations.

We may illustrate the difference between the old and emerging paradigms of science by contrasting two methods that might be employed to analyze a piece of music. From a strictly empirical perspective, one may observe vibrations of air that can be described in terms of their frequency, amplitude, and duration. Analysis of the data may reveal mathematical patterns in the frequencies and correlations between various amplitudes and durations. The array of possibilities for computation may generate a descriptive calculus. However, such a calculus would not enable us to attend to the meaning that gives rise to the music — the meaning that runs through each note giving it shape and context — the meaning that invisibly creates music and distinguishes it from sound. Music as communication, as the expression of experience, may be understood only through an act of personal imagination. Such imagination forms a foundation for a meaningful analysis of the properties of the music.

Similarly, consider the human hand from a bio-

logical perspective. It may be broken down into tissue, cells, amino acids, atoms, and even subatomic particles. However, such analysis would not yield an understanding that life runs through these bits of matter just as meaning weaves through the notes of a work of music. Life pulses through these physical elements and maintains them in their relations. In addition, the hand is sentient and is distinguished from other objects in its connection with human consciousness. It is in these contexts that the human hand was evolved and assumed its unique biological profile. As with the hand, so is it that the human physical body is more than a chemical machine; so it is that our complex systems embody invisible elements of being. Understanding human biology requires imaginative insight into the patterns and relationships that manifest themselves, partially, in specific physiochemical characteristics.

The point here is not to dismiss empirical observation. On the contrary, it is to suggest the need to observe phenomena with such acuity as to discern the fluid unity that underlies the isolated fact. Such perception requires a conscious focus that transcends illumination by word or number; it requires a scientist who understands theory and formula as instruments rather than ends in themselves — as symbols or signposts rather than the “reality” of science. Such perception requires fine personal judgment.

The emerging paradigm of science, in the final analysis, assumes that knowledge is neither fully public nor explicit. Underlying each observation, discovery, and theory is an individual who animates it like the music beyond the sound, like the life beyond the chemistry of the cell. The knower

is intimately involved in the knowing. The connection between the world and our theories, collectively and individually, is neither found on paper nor housed in technological memory; the union of the observed and underlying principles (as they are within our capacity to comprehend them) is in the human being himself. Such a conception of science, with its centrality of the individual knower beyond explicit theories and principles that both shape and transcend isolated observations, challenges educators to create curricula and

instructional methods that engage students imaginatively in pursuit of a cohesive and meaningful understanding of the world and its various aspects.

How might we educate so that students acquire theoretical knowledge as an instrument of understanding? How might we teach them to see the whole beyond the part? What steps might we take to heighten their capacity for observing patterns and relationships within and between things — fluid movement rather than static object? How might we transform the study of sci-

ence from the transmission of prescribed theoretical content to the assimilation of ideas derived from guided encounters with phenomena?

The answers to these questions are not set, nor are the questions themselves. The nature and purpose of science embody assumptions about how human beings think and may come to know the world. They, therefore, pose perhaps greater questions than the phenomena that spur scientific inquiry itself. It is in this spirit that this issue of *Holistic Education Review* is devoted to the exploration of emerging paradigms for the pursuit and study of science.

—Jeffrey Kane, Editor

The postcritical model of science views empirical information as clues to laws, governing principles, or deeper aspects of reality rather than the objective limits of knowledge. It views scientific theory as both the expression and source of personal insight — insight achieved only by an imagination that can grasp what is implicit beyond the explicit.

New Editorial Board Members:

An Introduction

Jonathan Kozol is author of, among others, *Death at an Early Age*, *Illiterate America*, *Rachel and Her Children*, and most recently *Savage Inequalities*. He received his bachelor of arts from Harvard University and went on to be a Rhodes scholar (Magdalen College, Oxford). Upon returning to the United States, he taught in a Roxbury, Massachusetts, public elementary school. This inaugurated his lifetime commitment to documenting the voices of urban poverty and critically examining the disparities among our nation's schools. He also established from the proceeds of his books the Education Action Fund, a nonprofit organization that helps inner-city children and their families.

Dilafroz R. Williams, Ph.D., is assistant professor at Portland State University in the Department of Educational Policy, Foundations, and Administrative Studies. She is interested in the moral issues of inclusivity and the nature and formation of communities in urban schools. Her previous appointment was at Syracuse University, where she was engaged for many years in providing academic support programs to minority and economically disadvantaged youth. For a number of years she taught science and math at a secondary school in Bombay. She is president of Wholistic Education, a special interest group of the American Educational Research Association.

Kathleen Kesson, Ph.D., recently completed her doctoral work in philosophy and curriculum studies at Oklahoma State University (OSU), where she has taught courses in pedagogy and the social foundations of education, as well as serving as a research associate for the Institute for the Study of Alternative Paradigms in Education. She also served as an adviser and lecturer for the women's studies program at OSU. She has published articles and presented papers on curriculum theory and education philosophy and was the winner of the 1991 Annual Ted Aoki Award in the field of curriculum. She serves on the steering committee of the Global Alliance for Transforming Education and is active with the American Educational Research Association. She has taken a core faculty position with Goddard College in Plain-

field, Vermont, starting in July of this year and will be working to develop a graduate program in holistic education there.

Madhu Suri Prakash, Ph.D., received her doctorate in philosophy of education from Syracuse University and is an associate professor of education at the Pennsylvania State University. She has been a Spencer fellow at the National Academy of Education and has chaired the program of the Wholistic Education SIG of the American Educational Research Association. She has published several articles on moral education. Her research on holistic education attempts to weave together the concerns and perspectives that define environmental, peace, and multicultural education today. She is currently working on essays that reveal the holistic philosophy of education articulated by Gandhi.

William Crain is professor and chair of psychology at the City College of the City University of New York. He is the author of *Theories of Development: Concepts and Applications* (Prentice-Hall, 3rd ed. 1992) and numerous articles on child development and education. In addition to his writings and professional activities, Dr. Crain works to promote child-centered, holistic education in his local community, Teaneck, New Jersey, where he is the Vice-President of the Board of Education. He and his wife Ellen, a pediatrician, have three children.

Paul Byers, an anthropologist, is adjunct associate professor of education at Teachers College of Columbia University. Prior to completing his formal training at Columbia as an anthropologist at the age of 44, he was a musician, cryptanalyst, magazine writer, and photographer. It is the latter occupation that led to his partnership with Margaret Mead as the visual anthropologist and co-author of *The Small Conference: An Innovation in Communication*. Over the years he has been particularly concerned with the problem of bringing newly recognized scholarly insights into inflexible and resistant social institutions. His research in human communication examines the unrecognized forms of information that are a significant part of our relationship.

Science Within an Ecology of Mind: Alternatives in Educational Reform

Arthur G. Zajonc

Recent surveys have led to a fundamental reassessment of American science education. As a consequence, many politicians and educators are calling for a massive effort to improve scientific literacy and mathematical competency to make the United States more competitive in tomorrow's high-tech economy. The shortcomings of these proposals are examined, and the outlines of an alternative are sketched that truly integrates various kinds of knowing, including science and technology, into an ecology of mind.

In early 1989, the Educational Testing Service and the National Science Foundation each released the results of surveys designed to rate the scientific literacy of Americans. A *Los Angeles Times* headline from the period captured the perception of the nation: "U.S. Pupils Near Bottom in Math, Science" compared with pupils in five other countries (Meisler, 1989). The National Science Foundation survey showed that scientific literacy among Americans evidenced startling gaps. For example, fewer than half of all Americans know that the Earth circles the sun once in a year. In February of this year, the Educational Testing Service announced the results of a new and broader study comparing American schoolchildren with those in a dozen other countries in mathematics and science. The *New York Times* headline announcing its results read, "American Children Trail in Math and Science" (1992).

In the face of this news, science education at all levels, from kindergarten through the university years, has become the object of intensive reexamination. The National Research Council issued a "stinging criticism" of biology teaching in middle and high schools. Colleges too have come under fire for curricula that are too lax. During the past decade, the faculty of Amherst College, for example, debated the merits of a science requirement, but steadfastly refused to adopt either a core or distribution requirement for its students. As a result, 17% of its students graduate without having taken a single course in either mathematics or science in their four years at Amherst.

The newspaper headlines, the television news features, and the loss of our high-tech edge to other countries such as Germany and Japan have all led to a climate of fear, if not hysteria, in the educational community. What are we doing wrong that so many of our citizens are so ignorant concerning the rudiments of science and technology? How can our economy ever hope to revive if technical education in the United States is slipping from year to year? What can

*Arthur G. Zajonc is professor of physics at Amherst College. His research areas are quantum optics and the experimental foundations of quantum mechanics. He also consults with schools and museums on science education and is a fellow of both the Lindisfarne Association and the Fetzer Institute. His forthcoming book, *Catching the Light*, is due out this February from Bantam, New Science.*

we do to change our system of education so that the United States is at the top of the surveys?

Responses to the above fall into categories: (1) the national standards and testing response, (2) the high-tech response, and (3) the education-as-business response. The first approach sets goals for scientific literacy, tests selected populations against those criteria of literacy, and then develops curricula to meet the stated objectives. The second approach sees the solution as lying in new educational technologies, such as sophisticated interactive multimedia computers. With one of these for every schoolchild, truly competent and equitable education will become available to all children, say its advocates. The third position maintains that the problem originates in the economic basis for education. It holds that education is a business like any other, and that the rules of a free-market economy should prevail for it as for every other aspect of our commercial life. By giving parents a "choice," the best and most economical educational product will come to the fore, and the poorest will die as they rightfully should.

These three responses often mingle in various ways, but I would like to treat each of them individually, for I believe that each, while sounding reasonable, offers us an illusory solution to a systemic problem. To begin, one might ask, why did both Germany and Japan decline to participate in recent comparative studies? What does one make of the fact that the study also showed that the top 10% of the students in the United States do as well as that group in any country? Is the climate of fear in the United States dictating a set of responses that are not in the long-term best interest of the children we are educating, nor of the nation to which they will eventually contribute?

Standards and testing

One of the most far-reaching programs espousing the first approach is that undertaken by the American Association for the Advancement of Science in its Project 2061. It offers a three-part response to the crisis in science education. Phase one, already published as *Science for all Americans* (Ahlgren & Rutherford, 1990), defines what people should know in science, mathematics, and technology. Phase two intends to translate the goals of phase one into several alternative prototype curricula for K-12. These are now under development by six site teams across the country. Phase three has not yet begun, but will take the various curricula developed as part of Project

2061 and market them to school districts all across the nation.

Project 2061 possesses many attractive features: its commitment to "less-is-more" in curricular content, its emphasis on interdisciplinarity (at least among the various sciences), its advocacy of a "teacher-centered" response to the problem, to name a few. Yet, there are other aspects of this response, and they are fundamental to it, that cause concern. First, they center around the basic premise that there is an American crisis in science literacy. The solution to it is then assumed to entail well-defined goals and a plan that incorporates national testing as the means to certify the attainment of those goals. In his recent piece "Standards Can Bite," the director of Project 2061, F. James Rutherford (1992), recognizes that standards are in and says that they are justified. He points to his *Science for all Americans* (Ahlgren & Rutherford, 1990) as providing a carefully conceived formulation of those standards. But as Rutherford himself admits, the standards and testing route is strewn with pitfalls.

We have ample experience concerning the educational bankruptcy of this approach to curriculum development. One might term it the Stanley Kaplan concept of curricular design. It works as follows: Educators wait until the first set of nation tests are given, now scheduled for the fall of 1993. Freewheeling entrepreneurs use those tests to design cram courses for each age group. And they work. Japan is flooded with thousands of such courses taken by millions of children. Similarly in the United States the best preparation for MCATs (the standard pre-medical examination) is found not in chemistry and physics courses as offered by our colleges and universities, but in cram courses offered by various commercial educational enterprises who design curricula for exactly that purpose. Does this mean that colleges are not doing their job? Far from it. Most college science curricula are already too heavily determined by what the MCATs choose to test. One continually fights to maintain the integrity and excitement of science in classes populated by students whose primary goal is scoring high on their MCAT exam. Recently a student came to my office to explain why she had failed the last two examinations. She informed me in a reasonable, matter-of-fact tone that since her study time was limited, she had to make a choice: She either crammed for her MCAT exam or studied physics.

Imagine a scenario in which every level of educa-

tion is dominated by this ethos. Every parent, every child, and finally every educator attends not to education, but to testing; not to the changing needs of childhood, but to the goals set for each year's examination. Gone will be the particularity of each class, the unique voice of the teacher sensitive to the spontaneous interests that arise in the classroom. Instead, instructors will teach from a national handbook, a compendium of the scientific and technical knowledge that they must convey, year after year, test after test. The methods and educational philosophies of cram course companies will become the model for educational reform. Such a system will fail as long as teachers are decent human beings who care more for their children than for their paycheck. If they see their young charges suffering under the yoke of de-personalized standards, they will simply ignore the standards. This makes room for the rise of private cram courses *à la* Japan, catering, of course, to the moneyed who can afford them. Heavy reliance on standards and testing will inevitably be accompanied by a drift toward cram course curricula.

That we should have clear educational expectations of our educators and our youth is not at issue. But the concept of reifying and enforcing them through extensive standardized national testing at all age levels is bankrupt. It will cause nothing good and much that is ill. The root image of education on which this approach is predicated is wrong.

Computers: The failed educational revolution

You would have thought that past lessons with audiovisual formats would have prepared educators and politicians for the verdict, but it did not. In fact, many still refuse to hear it.

When ushered into classrooms across the nation, computers were heralded as the technological innovation that would revolutionize education at every level, making toddlers into technological prodigies. A decade later, computers are as common as chalkboards in most American classrooms, and they continue to multiply as if by magic. Yet the promised revolution simply has not appeared. According to most candid observers, the use of computers in normal classroom instruction has been little short of catastrophic. Alfred Bork, a respected professor of computer science at the University of California, Irvine, put it this way, "So far what we've done is on the level of disaster. The problem is how to get people away from the romance with the technology and how to get them to think about improving learning"

(Berger, 1989, p. E7). Certainly, computers do offer a new range of possibilities for the educational innovator, but they offer only an incremental increase in options, not a revolution. In fact, if anything, by focusing our attention on educational technology, we have been distracted from the root problems and real solutions to today's educational malaise. Rather than spend time and scarce resources on the human assets we have in teachers and the basic necessities they require in *every* school district, we have spent tens of billions of dollars purchasing computers that usually do little more than gather dust in the corner of kindergarten and elementary school classrooms.

People educate people. They do so in a rich and varied environment that today includes much in the way of technology. That technologically abundant environment should find its way into classroom in a thoughtful, appropriate and demystifying way. Stop the hype and fanfare about computers. The real revolution in education will take place only when we give to our teachers and children the dignity and attention they deserve. The incentives to do so are less tangible. No IBM or Apple Computer Co. will reap a windfall profit from the professional development of America's teachers. Like today's politicians, big business has become interested in short-term returns on their investments. The long-term return on a capital investment in childhood and teachers is an old-fashioned value that does not sell well at stockholders meetings or at the election polls. Yet only such an investment will meet our educational ills, scientific and otherwise.

The business of educating

The argument runs: If students are scientifically and mathematically illiterate, it is because the educational establishment has failed them. In the tough corporate world, companies that perform poorly close up shop, and others take over their share of the market. Not surprisingly, President George Bush, through Secretary of Education Lamar Alexander, is espousing what will ultimately amount to the privatization of education, making it a responsibility of the business sector. Should this take place, it will mark the end of education as a high spiritual endeavor.

The privatization of education into commercial ventures is sold under the banner of "choice." However, choice can have various meanings, and the basis on which we make choices are and ought to be different in different arenas of life. To give a specific

example, imagine you are presented two paintings. On what basis do you choose to purchase one over the other? An art investor will see the painting not as a work of art, but as a piece of real estate whose value is to be judged by comparable sales. The painting is strictly an economic object to be safely warehoused until a good return on the investment can be made. The lover of art will pay no attention to such economic considerations. Rather, he will consider its beauty and meaning, what it would bring into his personal and communal life. To such a person, the "value" of a Van Gogh is independent of the auction price at Sotheby's. In fact, the very commercialization of art violates it. Art is not for rich investor/collectors, nor even for museums, but for people every day of their lives. The old Russian peasant with his revered if faded icon has the truer relationship to art.

As with paintings, so too with education. As a parent I should be free to choose the kind of school that educates my child, but the criteria of "choice," and the options offered to me, should not arise out of "smart" business decisions, but rather as the fruit of cultural and spiritual striving. If one wishes for a picture of the choices Americans will have in educating their children if Bush's privatization of education succeeds, scan the channels of your television set.

Bush offers choice within a free-market model for educational services. By contrast, as parents, our real choice in education must be based on the values, cogency, and beauty of the education a particular school offers. The criteria for choice are different in essential ways in the two spheres of life. Education is a cultural activity, not an economic one. The forces that drive the one will destroy the other. In the free-market model, the motivation is profit. Goods produced should be manufactured at the lowest possible cost and sold at the highest profit margin the market will bear. The basis for education can have nothing to do with such considerations. Yes, it must be practical, but the foundations on which education is built are hard-won principles, not profit motive.

In order for education to work, teachers must embody their educational philosophy. It is common wisdom that teachers educate as much or more by who they are than what they teach. This law of education is utterly alien to the economic sphere. A meal served in a restaurant is the same meal regardless of who serves it. Not so in education. The same lesson plan will succeed or fail depending on who teaches it. Like all great art, education must work freely. Parents will then choose on the basis of educational philosophy,

on the vision of the child that stands behind the curriculum — in other words, on the basis of truly important considerations.

Such a system of choice is predicated on real options being offered to *every* parent. In a system of education where tragic educational and financial inequities exist, of the kind documented in Jonathan Kozol's, *Savage Inequalities*, (1991) choice is a sham. This connects back to the issue of scientific literacy. The educational establishment *has* failed its children, but foremost in ways not addressed by the reforms above. The much publicized results of comparative tests are telling us something very important, but in the first place it is not that science education is in dire straits. The good schools in this country educate as well as any in the world. The data show as much. Where we are failing is in the uniformity of educational quality. We spend a greater amount on education than any other country when measured as a percentage of our GNP, but these resources are disproportionately focused on a small cadre of privileged districts and their children. The majority of children, especially in urban areas, fight against extraordinary odds to gain the basic skills and knowledge that would be available to all children in other industrialized nations. Test results in all areas will continue to show the same deficiencies as long as "savage inequalities" exist. None of the three educational reforms addresses this basic reality, and some will only exacerbate the problem.

From equity to ecology

The three approaches to educational reform sketched out above are, obviously, fraught with problems. To begin with, I believe they misinterpret the implications of the surveys that have been made. But even if one grants the need for reform in science education, as I do on other grounds, all three are based on erroneous assumptions. The "education-as-business" approach misapplies an economic model to a venture that must be grounded on fundamentally different principles. The high-tech approach mistakes technology for teaching, and so sows a covert distrust of the teacher as the core of the educational process. The standards and testing approach neglects the core of educational research and idealism for the payoff of test-driven curricula. Education is none of these. Yet I do believe that education, and especially science education, is in need of major revision.

The first step is to move away from a linear, atom-

istic model of learning in which one fact and one skill is added to the next, step by step, and instead embrace an ecology of knowing. The teacher, as artist, should be able to draw on the arts and literature when teaching mathematics and science. Instead of compartmentalizing learning into preprogrammed units on math, physics, chemistry, geography, and so on, each area of focus would connect with other areas of knowledge in natural and meaningful ways. Instead of viewing the education of the child as something built up brick by brick, a more appropriate metaphor might be a forest or swamp in which the many plant and animal species and conditions of soil, water, and light work together to make up a robust ecosystem. Educational subjects, like forest species, can only live in relationship with others. Each has its own integrity, but the weaving together of diverse subjects is what brings the mind to life. Science in such an ecology of knowing would not be a second culture *à la* C. P. Snow, nor be ghettoized on college campuses; rather it would become a full participant in the community of mind. With the ecosystem as a metaphor, a whole new geometry of education would arise, one to replace the monoculture of present education with a true polyculture.

Within this new geometry of education, teachers are critical. No amount of technology will replace them. The child first enters the physical world through the parent at birth. Later, the child enters the communal life of society and mind through the school. The child's teachers are the human doorway through which the child can step into that world. The teachers live what the child will become; they are exemplars of the future. How important, therefore, that the teachers in our schools are nurtured professionally and humanly. Their personal growth is essential to the healthy educational growth of their pupils. Here is where our first investment should be, both materially and spiritually.

Finally, our image of the child, which is central to

all educational philosophy, is impoverished. It needs to be ennobled and expanded in specific and concrete ways. To my mind, the most comprehensive understanding of child development is that underlying Waldorf or Rudolf Steiner education. Science education, in both its curriculum and its methodology, stands much to learn from the decades of experience possessed by Waldorf educators. Their emphasis in the early years on a phenomenology of science, on lively, imaginative participation, on the penetration of technology, are all a refreshing contrast to the concept-driven science curricula common today. Ideas arise out of experience. The concrete needs to precede the abstract, and the sciences should be experienced within the wealth of life, as but another species in the forest of learning.

Instead of reforming our educational enterprise based on misplaced fear of scientific and technical illiteracy, we should gauge its genuine problems. They center around deep-set inequalities in resource management, a covert distrust of the teacher, an impoverished image of the child, and the misapplication of business principles to a spiritual endeavor. Science education does need reform, but it should be grounded on hard-won insights, not fear or profit. Only then will science find its place within a vital ecology of mind.

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Goethe's Way of Seeing: Applications for Holistic Education

Mark Riegner

Although significantly less attention has been paid to Goethe's scientific endeavors than to his literary achievements, his methodology and his way of seeing the world have pedagogical implications for holistic education.

The possibility of a living, harmonious, and meaningful world can only be grasped and realized by a thinking and knowing that are themselves living, whole, and engaged.

—Douglas Sloan (1983, p. xiii)

Although few question Goethe's (1749–1832) credentials as a master poet and great literary figure, his scientific work is typically viewed as a historical curiosity and often regarded unfavorably by the scientific establishment. This state of affairs is somewhat ironic because Goethe, in his later years, hoped to be remembered more for his science than for his poetry. Despite the general disregard of his scientific endeavors, to date over 10,000 studies have been published that were inspired directly by Goethe's original research on morphology — a term he coined — chromatics, meteorology, and a host of other subjects (Amrine, Zucker, & Wheeler, 1987). An aspect that has generated much of this interest has been not so much Goethe's particular discoveries, which he himself never emphasized, but rather his methodology, his way of science, which is grounded in his way of seeing. The question arises, therefore, whether Goethe's approach to science — his way of seeing — enables one to grasp certain aspects of reality that might otherwise be hidden. Furthermore, can Goethe's way of seeing serve as a pedagogical tool to introduce students to ways of knowing that unite them with the world through experience?

In this article, I hope to show what constitutes a Goethean perspective and how it can indeed be applied pedagogically. Although examples can be drawn from many fields of science, my illustrations will reflect my background in biology.

If, as I maintain, Goethe's way of seeing is holistic, then a preliminary review of the nature of holism is necessary to form a foundation for further discussion. Although there exist several recent studies that treat the subject admirably, I will draw from the work of Henri Bortoft (1985) because, in my view, he articulates the nature of holism in a way that is most accessible.

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The nature of holism

Using the popular model of the hologram, Bortoft (1985) draws attention to the fact that if a holographic plate is fragmented, each fragment will still be capable of producing the original image in its entirety, albeit the resolution will be decreased relative to the intact plate. Thus, each fragment, or part, has a relationship to the whole; the whole is encountered in each part. This stands in contrast to a conventional photographic plate, which if fragmented results in a disarray of parts, each of which is unable to reflect the original image in its entirety.

A more familiar example appears in our experience of reading a text. The individual words, like fragments of the holographic plate, serve as parts through which meaning can emerge, meaning being equated with the whole, the intangible "something," which is not a thing, yet not nothing. Thus, words are windows through which meaning can come to presence, and they gain significance to the degree that meaning can emerge through them. By taking the words of a sentence and jumbling them up, the totality remains present, but the whole, or meaning, is lost. Accordingly, the whole and the totality are not equivalent, although the whole can make itself present more readily through the totality of parts.

Bortoft continues by stating that wholeness is not merely the sum of the parts, nor is it a "superpart" that dominates the others. Rather, the whole is given simultaneously with the parts, just as a melody emerges through the notes and intervals; the two form a unity and are reciprocally related. The parts without the whole are noise; the whole without the parts is inaccessible or even nonexistent.

According to Bortoft, because the whole is not a thing, yet not nothing, we necessarily must experience it differently than our experience of things. On one hand, things present themselves to our awareness from the outside, impressing themselves on our senses. The whole, or meaning, on the other hand, makes itself present as an inner response, as an inner experience; we do not encounter meaning "out there." Accordingly, in order to be moved inwardly by the whole more effectively, one needs to cultivate a state of *active receptivity*. Such a state is characterized by deep attentiveness and an awareness that one is engaged actively in perceiving. How can one become actively engaged in perceiving?

Consider this simple, popular example. The ambiguous nature of the cube in Figure 1 allows it to appear with its front face pointing either downward

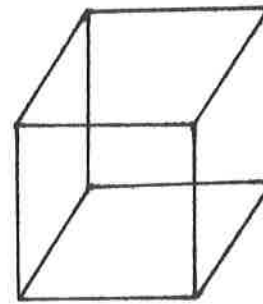


Figure 1. The ambiguous cube can appear in two orientations.

to the left or upward to the right. Furthermore, the observer can switch the perceived orientation at will, while the sense impression remains unchanged. The ability to consciously order our perceptions, so-called intentionality, enables one to participate in the act of observing. This quality of participation is critical to Goethe's way of seeing.

Goethe's way of seeing: Educational applications

To apply the fruits of Bortoft's (1985) analysis and thereby demonstrate a Goethean way of seeing, one can remove and arrange the leaves of a plant into a sequence from the base of the stem to its apex (Fig. 2). From the basal leaves upward, the leaf shape changes sequentially. From a static perspective, each leaf is seen as a finished form in space bearing only a spatial relationship to the other leaves. From a Goethean perspective, however, the individual forms are seen in dynamic relationship to one another, that is, as a graded series. Accordingly, each leaf is seen as a visible step — a "frozen moment" — of a continuum. Although not sensibly perceived, the continuum is nevertheless a cognitive experience, for if the leaves are mixed randomly, a student never having seen the plant is able to order them correctly without much difficulty. The "invisible" continuum, or gesture, therefore, can be considered as belonging to the plant as much as the material leaves. Thus, what exists between the sensibly perceived elements, what *moves* between them, is as crucial to a Goethean way of seeing as the elements themselves. Moreover, the gesture is what provides the context, the inherent logic, that unites the diversity of forms. An examination of only the first and last leaves of the sequence, when observed out of context, that is, in the absence of the sequence, would conclude that the two leaves bear no relationship to each other. However, when examined in context, the relationship between the

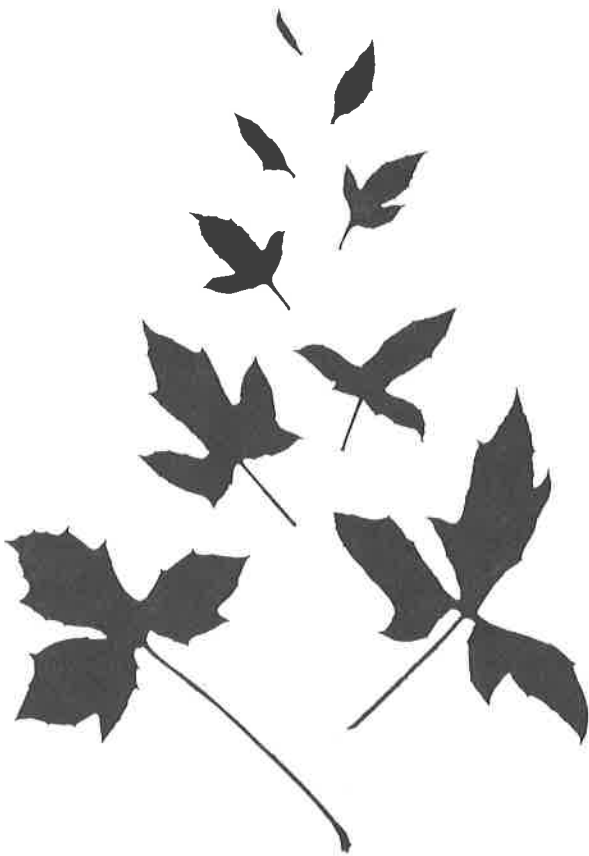


Figure 2. The leaves of gall-of-the-earth (*Prenanthes trifoliata*) arranged as they would appear on the stem.

two leaves is patent; they clearly belong to the same plant.

The correspondence between the above example and the earlier discussion is apparent: the leaves, or parts, are the focal points through which the gesture, or whole, can come forth. Just as a melody comes to presence through notes and intervals, the gesture of a plant can emerge through its foliar sequence. Moreover, just as we realize immediately when a “wrong” note is played, so too do we recognize when a leaf is placed out of sequence.

The heuristic value of the leaf example can be pursued further. If students are asked to draw a leaf that could potentially exist between any two in the sequence, they are usually able to accomplish the task without difficulty. Through questioning and discussion, it soon becomes apparent that an infinite number of leaf forms exists, yet the number of possibilities is limited — not any form will “fit” between two selected leaves. Furthermore, in order to draw an intermediate leaf, the student must be able to “see” with the mind’s eye the *potentiality* of the plant.

Such “seeing” requires the imagination, but an imagination that is tutored by the phenomena themselves (in this case, the leaves) and not merely subjective. Such exercises lend themselves well to discussions of infinite potentiality versus limitation, freedom versus form, the ideal versus the world as it is, which, for many older teenagers and college students, touch on contemporary life questions.

The activity of seeing imaginatively with the mind’s eye can be elaborated further with clay modelling. In a preliminary exercise, students are asked to model five abstract forms in a metamorphic sequence. The five forms are then brought into class, mixed up, and given to another student who has to determine the intended sequence and then describe what the artist had *in mind*. This activity leads to the discovery that we can experience the intangible meaning that another person has expressed through matter, in this case, clay. The five forms, the parts, give expression to the intention, the whole. Of course, sometimes a series is determined that is different from what the artist intended; this, too, can lead to interesting discussions regarding how phenomena can be viewed validly from different perspectives.

In a subsequent clay exercise, students are again asked to model five abstract forms in a sequence. This time, however, they give only the first and last forms of the series to a partner, and conceal the middle three. The partner, then, has to model what she believes the middle three forms to be and provide a rationale. Afterward, the original middle three forms are revealed and a comparison is made with the new forms. Occasionally, an uncanny resemblance may result. Here, too, students can experience how an intended meaning can come to presence through a series of parts and how the parts gain significance to the degree that they reveal an inherent order. Furthermore, what may at first appear as two unrelated forms, like the first and last leaves of a sequence examined out of context, can be coherently related through intermediate forms.

With that groundwork established, it is possible to turn to nature. In a natural history writing class I teach, I ask students to select a special place outdoors they can visit regularly. I encourage them to cultivate their imagination by seeking, identifying, and writing about relationships between the various things (i.e., parts) in their chosen place. For example, one may select an old, twisted juniper tree as a focus and then relate all other things — stones, lizards, flowers,

bird songs, clouds, etc. — in that natural place to it. By doing so, the relationships become as crucial as the things themselves. Each relationship, which is discovered by exercising both observation and imagination, assumes a living presence.



Figure 3. Prescott College natural history writing class.

By practicing these and other exercises, the students develop the ability to enter into nature in a state of participation and to express their experiences through the written word. Once these preliminary activities have become new tools, the students are prepared to engage in a culminating activity. For this exercise, we go together as a group to a natural area. The students are asked to explore the place for a given time and then to write about it as participants. Afterward, we come together in the place and each of us shares our impressions by reading aloud what we have written (Fig. 3).

From my experience thus far, I recognize that two special things occur. First of all, the character, or essence, of the place comes to expression through our words. Each of us, from one's own perspective, brings to presence certain qualities of the place: One will describe the sound of the wind passing through the trees; another, the texture of the stones; another, the flight pattern of a butterfly, or the play of light on the landscape. In doing so, the place becomes enlivened and a sense of sacredness develops. Second, by each of us sharing our written impressions and deepest feelings about the place, we develop a unique group dynamic in which our individualities are also given expression within a supportive atmosphere. So not only do we bond with the place, but we also cultivate mutual respect and understanding for one another. As the character of the natural place emerges through our descriptions, a moving human

presence emerges through our sharing. The place will never be the same and neither will we.

Goethe's way of science: A reorientation to the world

In his perceptive critique of modern Western civilization, Morris Berman (1984) maintains that, since the sixteenth century, Western consciousness has been progressively alienated from the phenomenal world, and there no longer exists an

ecstatic merger with nature, but rather total separation from it. Subject and object are always seen in opposition to each other. I am not my experiences, and thus not really a part of the world around me. The logical end point of this world view is a feeling of total reification: everything is an object, alien, not-me; and I am ultimately an object too, an alienated "thing" in a world of other, equally meaningless things. (p. 3)

According to Berman, our modern alienation, derived from the Cartesian dichotomy, has had dire consequences for nature. Douglas Sloan (1983) succinctly identifies what that collective impact has been: "The loss in our ways of knowing of a sense of a prior and undergirding wholeness has provided a

In its attempt to intentionally reunite subject and object and thereby cultivate a participatory consciousness, Goethe's way of seeing may serve as an antidote to the modern-day estrangement from nature, the alienation of observer from observed. Furthermore, by developing the ability to "see with the imagination," the observer may reclaim the experience of wholeness, an experience that is perhaps typical of early childhood but, with the development of self-awareness, lost before it can be articulated.

Goethe's way of science also holds promise for research and has already shown itself capable of revealing patterns and relationships to which analytical methods are blind. An exceptionally thorough application of Goethean methodology is found in the work of biologist Wolfgang Schad on form and pattern in mammals (1977; see also Riegner, 1985); other studies have also demonstrated the value of a Goethean approach (Riegner, in press).¹ Because such studies are grounded in broad contexts, a summary treatment here could not possibly do justice to the various works. Thus, readers are encouraged to turn to the original literature.

To enter fully into Goethe's way of science, one's faculty of cognition must become active and self-reflective in a way to which we are typically unaccustomed. Goethe's phenomenological approach necessitates more than just a paradigm shift in which the *content* of thinking changes. It calls for a conscious

transformation and enlivening of the thinking activity itself. The inherent challenges to undertaking such a reorientation are formidable, and the benefits of reintegrating ourselves into the world remain uncounted. However, if those challenges are ignored and we remain where we are at present, what opportunities will pass us by?

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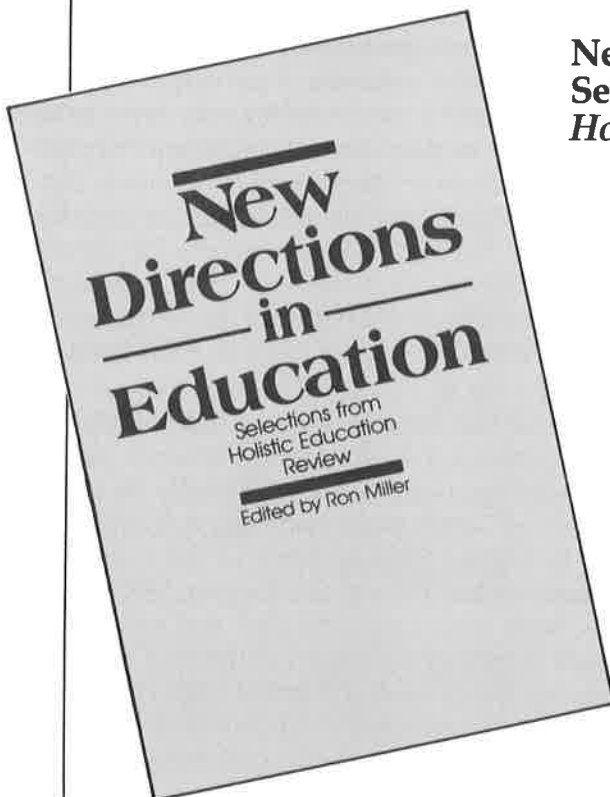
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Note

1. This essay demonstrates a Goethean approach to ecological studies and contains many references on applied Goethean science.



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The Shifting Worldview: Toward a More Holistic Science

Willis W. Harman

Reductionistic science, superb for the prediction-and-control task for which it was designed, has mistakenly been elevated by modern society to the position of a worldview. The time seems right for insistence on a holistic science, based on new metaphysical foundations, within which present positivistic, reductionistic science is a limiting case.

No issue is more critical to the educational enterprise than the question of what worldview will inform our goals and guide our efforts. At one time the worldview of the Christian church was dominant in both European and North American societies; it may not have been taught overtly (certainly not in the U.S. public school system), but it was the unquestioned foundation that more or less subtly shaped the curriculum. More recently the worldview of modern science has prevailed; its influence permeates every aspect of education from curriculum to method to evaluation.

Many were the battles as the worldview of modern science came to supplant its predecessor. The issue of neo-Darwinism versus Creationism has perhaps been the most visible, persisting even today. But advances in science, from the early discoveries of paleontology about the age of the Earth, to Freudian psychoanalysis, to Skinnerian behaviorism, to the implications of split-brain research, have had their impacts on education, many of them controversial. Most consequential, no doubt, was the gradual erosion, under the battering of positivistic science, of the religious foundations of value consensus — an erosion that led to a kind of moral relativism whose ultimate consequences are not yet clear.

We now seem to be witnessing another shift in the dominant worldview, possibly as dramatic as that of the scientific revolution. Not a departure from a scientific worldview, necessarily, but certainly a radical departure from the mid-20th-century scientific worldview. This shift has the most profound implications for the teaching of science, and for education in general — its role, its content, its structure and methods, and the judgment of its accomplishments.

When I studied science a half century or so ago, its basic framework (I now realize) was presented as a kind of official dogma. The student was encouraged to raise all sorts of questions within the framework, but certainly not to criticize its basic characteristics.

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Now in the 1990s, serious questions are being raised about the worldview based on that science. This critique has become so important that we are remiss if we teach science — or any other subject — without encouraging students to raise questions about modern society's most fundamental and widely accepted assumptions.

Signs of a shifting worldview

Like every other society in history, modern industrial society rests on some set of largely tacit, basic assumptions about who we are, what kind of a universe we are in, and what is ultimately important to us. Such issues are widely assumed, in modern society, to be settled by scientific authority.

Indications of a basic shift in worldview can presently be seen throughout the industrialized world, particularly in the English-speaking portion and in northern Europe. In brief, we may characterize this change by three features. One is a trend from fragmentation, competition, and separateness to emphasis on *oneness and wholeness*, especially apparent in the ecological, feminist, and holistic health movements. Although the parts may be distinguished for pragmatic purposes, it is essential to maintain a view of the whole; although medical technologies are impressive, health is a function of the whole human being — mind, body, and spirit; although we may compete, we are nonetheless each part of a unity, so that no one of us really "wins" unless we all do. The second feature is a movement from faith in external authority (religion, science, "experts") to faith in *inner knowing, inner authority, and inner resources*, manifested in involvements in various meditative disciplines and spiritual searches, and in some of the newer forms of psychotherapies and executive development seminars. The third change is from control to *essential trust* — from feeling a need to exert control to feeling a need to express one's authentic self, to *be*, with deep trust in the human spirit and in a spiritual universe. Admittedly, the group of persons involved in this shift of worldview comprise a minority sector in society, but it is a relatively well educated minority that is recent in appearance, and growing rapidly.

The emerging worldview challenges the scientific materialism of an earlier part of the century. Discerning persons have long been aware that there was

something wrong with the scientific picture of reality. Almost by definition science fails to accommodate human volition, conscious awareness, and all aspects of those inner experiences, such as the aesthetic and spiritual, that bring richness and meaning to life. William James had said long ago, about the vast realms of inner experience, "No account of the universe in its totality can be final which leaves [these] disregarded."

For generations Western society has been attempting to manage its affairs guided by two incompatible pictures of reality — one "scientific" and the other in some sense "spiritual" (Snow, 1969). The former picture has been dominant in our most powerful institutions, including education; the latter is essential to a whole view of life. The scientific worldview tends

Almost by definition science fails to accommodate human volition, conscious awareness, and all aspects of those inner experiences, such as the aesthetic and spiritual, that bring richness and meaning to life.

to deny the spiritual, while the view emphasizing the human spirit finds science irrelevant to the important questions of life. This certainly suggests that something is fundamentally wrong somewhere.

The Danish philosopher Søren Kierkegaard observed that there are two ways in which one can be fooled: one is to believe something that isn't so; the other is to refuse to believe something that *is* so. One of the things we have been most reluctant to believe (although it has been pointed out by many well-known figures in the past, from Plato to Ouspensky) is that we are all hypnotized (quite literally) by our culture to experience reality in the culturally approved way. That is as true for us in the modern world as it is for cultures that we term "primitive" or "prescientific." The educational task to which we are called is not so much to learn new facts and skills as to become "dehypnotized."

A half century ago, educated people in North America and Europe tended to be convinced of the reality described by scientific materialism. But these materialistic premises are now being challenged, and many of the best-educated people today appear to be

persuaded by some sort of transcendentalist beliefs. Thus we have the paradox that *science has increasing power to predict, control, and manipulate the physical world, but decreasing credibility as a complete worldview suitable for the guiding of human affairs.*

A new paradigm in science?

The proposition we shall explore is that the paradox can be resolved through a fundamental change in scientific paradigm. The early indications of a new holistic paradigm are readily visible, although the orthodox faith — that reductionistic science can eventually explain all — remains strong in the scientific community. Most scientists today would agree that science has moved away from the strict determinism, reductionism, positivism, and behaviorism of a half century ago. Many would agree that a future science will probably transcend the limitations of present mainstream science in at least three respects:

1. It will be more *holistic*; that is, it will tend to involve more whole-system perspectives, and the biological sciences will put more emphasis on organismic models, even organism-in-environment dialectical models. In holistic models there are no simple cause-effect relationships, but rather whole systems, with the parts developing or evolving together. For example, an organism is, in a sense, its own cause and effect.

2. It will involve more *participatory methodology*, that is, more recognition that understanding comes, not alone from being detached, objective, analytical, coldly clinical, but also from cooperating or identifying with the observed and experiencing it subjectively. In the case of the social sciences, participatory methodology implies a real partnership between the researcher and the individual or community being researched, an attitude of "exploring together" and sharing understandings.

3. It will be more open to including *subjective experience* as data, rather than building up its worldview based almost exclusively on objective, physical-sense data.

Although these three characteristics, as broad generalizations, would elicit much agreement in the scientific and philosophical communities, the degree of consensus decreases markedly if we include some of their more subtle implications. For example, does recognizing the subjective aspect of knowledge mean that the long-standing concept of a completely deterministic universe is invalid (even in the statistical sense of quantum physics)? Is causation to be

understood as subjective as well as objective; is consciousness not only phenomenon, but also agency?

Does the holistic assumption imply that if consciousness is part of human experience, it is therefore a characteristic of the whole? Thus should we not be surprised by evidence that seems to point to consciousness either being present throughout the evolution of, or in some sense being prior to, the material world? Does it seem likely that the ultimate explanations of ontogenesis, morphogenesis, regeneration, and related biological phenomena will have to include something in consciousness analogous to "image" or "idea"? Does holism imply that if consciousness is a characteristic of the whole, some phenomena are not as "anomalous" as had heretofore appeared to be the case — an example being "meaningful coincidences" or "synchronicity," where there is no physical connection between two events, yet there appears to be a meaningful connection?

Do the holistic assumption and inclusion of the subjective imply that since we humans are part of the whole, and experience "drives" or "urges" such as survival, belonging, achievement, and self-actualization, there is no *a priori* justification for not assuming something like these are characteristic of the whole? Since we experience "purpose" and "values," is there justification for assuming these may also be characteristics of the whole? In other words, may the universe be genuinely, not just apparently, teleological?

Do these three assumptions imply that ultimately the relationship of the human mind to the world is not dualistic but participatory? That, as Goethe held, nature's unfolding truth emerges only with the active participation of the human mind? Do they imply that we have to take another look at experiences of "mystical" states of consciousness, of "other dimensions of reality"? Such experiences have been at the heart of all cultures, including our own. They have been among the main sources of the deepest value commitments. Could they also be important investigative tools, "windows" to other aspects of reality?

Does the "participatory methodology" trend essentially redefine power relations between "expert" and "subject" in the social sciences, and thus alter the political use of research findings?

A possible reconstruction of science

I would like to explore one possible resolution of the paradox described above. Thus I will attempt to

support, in brief argument, the following nine points:

1. Serious difficulties with present science *do not seem resolvable* short of a reassessment of its metaphysical foundations.

2. Science is an activity of making and testing models of reality, guided by certain values and *based on certain ontological and epistemological assumptions*.

3. The assumptions that have shaped present science were adopted in the 17th and 18th centuries for reasons that are less valid today.

4. There is much in human experience that supports *alternate assumptions* of oneness and the validity of intuition.

5. These replacement assumptions would yield an "extended" unitary science with a richer, more satisfying methodology.

6. If science were to be reconstructed on the basis of these alternate assumptions, almost all of present science would stand, but it would be understood in a broader context.

7. Major widely recognized puzzles in the physical, biological, and human sciences would appear more resolvable in the proposed reconstruction.

8. A vast range of anomalies appear to be more understandable in the proposed reconstruction.

9. A scientific worldview revised along these lines seems likely, and this has important social, economic, and political — as well as educational — implications.

Major puzzle areas of science

Among the areas where there are major failures of the prevailing scientific worldview to accommodate well-established evidence are the following:

(a) The fundamental inquiry within physics into the *ultimate nature of things* does not appear to be convergent. The search for fundamental particles seems to lead to still more fundamental particles; the search for the ultimate reductionist explanation seems to point to a wholeness. Basic assumptions of modern science were that reality exists independent of the mind of the observer and that objectivity — detachment of observer from observed — is a desirable goal. A fundamental initial assumption of physics, which has influenced every other area of science, was that ultimate reality consists of fundamental particles, separate from one another and interacting through mechanisms (especially fields) that can be discovered and described. Over the next several cen-

turies physics developed from these assumptions, finally concluding (through quantum mechanics) that observer is *not* separate from observed; fundamental particles are *not* separate from one another (Bell's theorem); and the consciousness of the observer is *essential* not only to the observation, but also to the existence of the thing being observed (since only when an observation is made are the probability functions of quantum mechanics "collapsed" into actualities). This contradiction forces one back to the initial metaphysical assumptions, and it leads one to question whether even quantum physics offers sufficient foundation for the emerging worldview.

(b) There appears to be evidence for a fundamental *self-organizing force in living systems*, from the smallest to the largest known organisms, which remains unexplained by physical principles. Living systems exhibit a tendency toward self-organization (e.g., homeostasis; intricate patterns in flowers, butterfly wings); toward preservation of integrity (e.g., healing and regeneration; ontogenesis from a single fertilized egg to an adult organism); toward survival of the organism and the species (e.g., complex instinctual patterns for protection and reproduction). The smallest microorganisms have shown remarkable abilities to mutate and adapt to changing environments (Margulis, 1986). The evidences of a cumulative effect, over time, of this self-organizing tendency in evolution cast doubt on the adequacy of the neo-Darwinist orthodox view.

(c) There is a persistent puzzle of "action at a distance" or *nonlocal causality*. This shows up, as we have already observed, in the far reaches of quantum physics. It also appears in the area John Beloff (1977) calls "*meaningful coincidences*," referring to two or more events where there appears to be a meaningful connection although there is no physical connection. Here "meaningful" may refer either to the subjective judgment of the observer, or to a judgment based in historical data (as in the case of astrology or the I Ching). The term "meaningful coincidences" includes Carl Jung's "synchronicity" (Peat, 1987) and most of the "paranormal." Examples include apparently "telepathic" communication, seemingly clairvoyant "remote viewing," and the "coincidence" between the act of prayer and the occurrence of the prayed-for, such as healing. Another example is the feeling of having a "guardian angel" when a person feels warned about a danger or provided with a particularly fortuitous circumstance in life. A host of

historical and anecdotal examples fall into the categories of "miracles" and "psi phenomena."

(d) Our scientific knowledge about the universe appears to be incomplete in that there is no place in it for the *consciousness of the observer* — nor, in general, for *volition* ("free will") or any of the other attributes of consciousness. Nobel laureate Roger Sperry (1987) insists that no science can be complete which does not include "downward causation," from the higher level of consciousness to the lower, physico-chemical level.

(e) One of the most perplexing aspects of consciousness' challenge to science is the *concept of the self*. The conscious self is ineluctably involved in observation, yet the science constructed from those observations contains no place for the self. Psychologist Gordon Allport wrote in 1955, in a little volume entitled *Becoming*, "For two generations, psychologists have tried every conceivable way of accounting for the integration, organization and striving of the human person without having recourse to the postulate of a self." The endeavor is still going on.

(f) Related, but worthy of separate mention, is the area of *altered states of consciousness*, including particularly those states traditionally sought out in a spiritual or mystical context (Huxley, 1945; Rossner, 1989).

Of course we are not justified in assuming that since science has trouble with all of these areas, there must be a single source of the difficulties — namely, its metaphysical foundations. Nonetheless, that is a possibility which a few scientists are now taking seriously, to an extent that would have been unthinkable even a couple of decades ago.

The assumptions of science

Science is an activity of making and testing models of reality, guided by certain values and based on certain metaphysical assumptions (Rubenstein, Laughlin, & McManus, 1984). Such guiding values as openness of inquiry, public validation of knowledge, nonattachment to particular theories and models, and healthy skepticism seem essential to the modern scientific spirit. These guiding values are to be distinguished from various metaphysical assumptions, such as:

- *Objectivism*, a conviction that the observer is separable from the observed.

- *Reductionism*, the assumption that a "scientific explanation" of complex phenomena is in terms of component, simpler phenomena.
- *Positivism*, the assumption that all that can be known scientifically is derivable from physically measurable data.
- *Determinism*, the assumption that phenomena can be predicted from a knowledge of the governing scientific laws and initial conditions (at least in the statistical sense implied by quantum physics and chaos theory).

Such guiding values as openness of inquiry, public validation of knowledge, nonattachment to particular theories and models, and healthy skepticism seem essential to the modern scientific spirit.

By the middle of this century there was almost complete consensus that these assumptions (collectively known as the assumptions of *logical empiricism*) are the proper foundation assumptions for science. They are not the only ones on which a knowledge system, guided by the scientific spirit of inquiry, might have been based. However, they are so well established that to many scientists these are the assumptions that *define* modern science; if they are not satisfied, the knowledge system is not science, but something else.

Origin of the present metaphysical assumptions

The metaphysical assumptions listed above appear to derive from a basic cultural shift in western Europe at the close of the medieval era. Life for the person living in the medieval world (as in many traditional societies) was a seamless whole; the world enchanted, permeated with meaning, infused with spirit. Humans felt at home in nature; the universe was perceived as alive and imbued with purpose. The world perceived by the typical educated person in western Europe in 1600 was still the world of the Middle Ages.

But by 1700 the "scientific heresy" had become so widely accepted that the informed person literally perceived a different reality, much more like today's. He saw essentially a dead universe, constructed and

set in motion by the Creator, with subsequent events accounted for by mechanical forces and lawful behaviors. Man was seen as separate from, and potentially controlling of, nature.

The basic ontological and epistemological assumptions underlying modern science have their origins in this 17th century cultural shift, and in the tension between science and the church at that time (which brought about a division of territory — matter and physical energy going to science; mind and spirit to the church). Thus for an assortment of reasons, Western science by the 18th century had

The separateness view produced a kind of scientific knowledge that is immensely powerful in its ability to predict and control. But because of its partial nature, Western society erred in attempting to make of that kind of knowledge a worldview to guide individual and social decisions.

adopted an *ontological assumption of separateness*: separability of observer from observed; parts from whole; organism from environment; humanity from nature; mind from matter; science from religion — separateness of the “fundamental particles,” which were assumed to compose ultimate reality, from one another.

This assumption of separateness leads to the hubris that humankind can pursue its own objectives as though the Earth and the other creatures were here for its benefit; to the myth of the “objective observer”; to reductionist explanations; to the ethic of competition. It implies the locality of causes; that is, it precludes “action at a distance” either in space or in time. It implies the *epistemological assumption that our sole empirical basis for constructing a science is the data from our physical senses.*

These two metaphysical assumptions amount to the premise that the basic stuff of the universe is precisely what physicists study, namely, matter and physical energy — ultimately, “fundamental particles,” their associated fields and interrelationships. The assumption of positivism follows from the separateness of the mental/spiritual from the physi-

cal and the later assumption that mental must be derivative from physical (and that the subject of the spiritual can be dropped).

Determinism follows from positivism and uniformitarianism, a further ontological assumption that the same laws of nature hold everywhere in the universe, and through all time.

The alternate holistic assumption

These basic assumptions of logical empiricism are generally agreed to have served the physical sciences well — at least up to the point where the insights of quantum physics raised new questions. They have left the biological sciences with major puzzles unexplained (although there is a currently prevailing faith that ultimately everything in biology will be explained by molecular biology). And as the human and social sciences have attempted to achieve the prestige and power of physics by building on the same assumptions, the world they describe seems remote from human experience.

There is at least as much evidence in human experience to support an alternate ontological assumption of oneness — that everything experienced, including both physical and mental, is part of an intercommunicating unity — as there is to justify an assumption of separateness. Love, empathy, and aesthetic and spiritual sense all imply a joining or unity. The testimony of mystical experience, and the “perennial wisdom” of the world’s spiritual traditions, report an ultimate experience of oneness. “Meaningful coincidences,” two or more events that appear to be meaningfully connected but not physically connected, imply a level of connectedness beneath the apparent separateness of ordinary experience.

In such a unitary view, it is only when a part of the whole can be sufficiently isolated from the rest that reductionistic causes appear to describe adequately why things behave as they do, that the ordinary concepts of scientific causation apply. The separateness view produced a kind of scientific knowledge that is immensely powerful in its ability to predict and control. But because of its partial nature, Western society erred in attempting to make of that kind of knowledge a worldview to guide individual and social decisions.

One of the main implications of a science based on

the premise of an ultimate oneness is the epistemological assumption that we contact reality in not one, but two ways. One of these is through physical sense data — which form the basis of normal science. The other is through being ourselves part of the oneness — through a deep intuitive “inner knowing.” Putting it another way, the epistemological issue involved is whether our encountering of reality is limited to being aware of, and giving meaning to, the messages from our physical senses (an attitude approvingly referred to as “objective”), or whether it also includes a subjective aspect in an intuitive, aesthetic, spiritual, noetic, and mystical sense. (We might note in this connection that an intuitive and aesthetic factor already enters into normal science in various ways — for example, the aesthetic principle of “elegance”; the “principle of parsimony” in choosing between alternative explanations; even in distinguishing what are “phenomena” or “data” from the background that simply goes unnoticed.)

A promising set of replacement assumptions

Thus we are led to consider that science might be restructured on the basis of an *ontological assumption of oneness and wholeness*, and an *epistemological choice to include as input both physical sense data and inner, subjective experience* — in particular the experience of such trained “inner explorers” as are found in the various esoteric and spiritual traditions (Harman, 1991). Of course, one is hesitant to consider such a radical restructuring of science if some lesser measure will suffice to deal with the puzzles. However, there are growing indications that the more radical treatment is coming to be perceived as necessary.

Such an “extended,” holistic science would meet many of the criteria of the present attempts to reform science to deal with the puzzle areas identified in (1) above. It would not invalidate any of the physical and biological science we now have; it would, however, be more inclusive. This proposed unitary science would favor more holistic and organismic models in the biological sciences; it would not be reductionist in any dogmatic sense. The biological sciences involve holistic concepts (e.g., organism, function of an organ), which have no counterparts at, and are not reducible to, the physical sciences level. Similarly, there is no reason to assume that characteristics of consciousness (e.g., emotions, rationality, self-awareness) are reducible to the biological level. In other words, although theory reduction (as, for example, the laws of optics explained through elec-

tromagnetic theory) will be welcomed whenever it proves to be possible, it is not a dogma of this unitary science that it must be, in general, possible.

Science thus extended implies the appropriateness of finding ways to include subjective experience as relevant data in the creation of our pictures of reality. The entire realm of subjective experience opens up as a source of data, giving a far broader base on which to construct our models of reality.

This unitary science would include and emphasize more participatory methodologies, and it would rely more on empathic, intuitive insight. It would assume that, whereas we learn certain things by distancing ourselves from the subject studied, we get another kind of knowledge from intuitively “becoming one with” the subject. The best natural biologists (as contrasted with molecular biologists) have always depended on empathy and intuition for insight into the structure and behavior of living organisms. This participatory nature would have a side effect in the social sciences, where participants will tend more toward full disclosure if they feel that they have some power over the research findings claimed, and over how they are used. Clinical psychology and cultural anthropology are examples of sciences that are already leaning in the participatory direction.

Openness to alternative theories and explanations, and healthy skepticism, would be at least as important in this extended unitary science as they are in present science. Consensual validation of findings would also remain of central importance, but it would be accomplished in ways that depend less on manipulation (e.g., the double-blind controlled experiment), and more on trust, respect, and cooperation — as, for example, the ways of obtaining consensual validation of profound inner experience that are found in some spiritual traditions. We recognize that something like this has been attempted before (in introspective psychology, phenomenology, etc.), and that the scientific community has generally agreed there are no dependable ways of validating the claims of introspective, “private” experience. But that was prior to the current waning of faith in pure positivism. The appropriate dictum of Antoine de St. Exupéry: “Truth is not that which is demonstrable; truth is that which is ineluctable” — that which cannot be escaped.

One consequence of scientific exploration in this holistic mode is that the investigator may be transformed in the process. In participatory research the experience of observing brings about sensitization

and other changes in the observer. The scientist who wants to study, for example, meditative processes and the transcendent experiences so treasured in the various spiritual traditions has to be willing to undergo the deep changes which will make him a competent observer.

The broader context of an "extended" unitary science

Present scientific laws appear to hold in situations where consciousness as agency is excluded; they may or may not hold when extrapolated to extremes of space or time (as when extrapolated back to the "Big Bang" origin of the universe). Furthermore, they may yield insufficient explanatory power in the biological sciences; it is not at all clear, for example, that they can account for the self-organizing characteristics of living organisms (Goodwin, 1987). There is no reason to doubt the validity of present findings regarding the influence of genetic structure on the development and behavior of organisms, but the new science would be open to other influences as well; for example, the extended science would not presumptively exclude influences that appear to be nonphysical.

It is particularly interesting to see how evolution appears in such a worldview. In the Darwinian concept, the organism and its environment have separate existences, separate properties. The environment changes, through its own processes; the organism changes in response to the environment, or the species is extinguished, as the case may be. The outlook of a unitary, oneness-based science leads directly to the dialectical view of Levins and Lewontin (1985), in which change is explained in terms of the opposing processes united within the evolving system of organism and environment. Organisms are both the subjects and the objects of evolution: They both make and are made by the environment and are thus actors in their own evolutionary history. The most striking example is found in the conversion of the reducing atmosphere that existed before the beginning of life, by living organisms themselves, to one that is rich in reactive oxygen. Lovelock (1988) gives other examples supporting his Gaia concept of a self-regulating biosphere.

In the neo-Darwinian thesis, human consciousness is assumed to have biologically emerged from animal consciousness. But in the "oneness" view, as Owen Barfield puts it (1982), consciousness "is the inner side of the whole, just as human consciousness is the inside of one human being.... There is indeed

only one world, though with both an inside and an outside to it, only one world experienced by our senses from without, and by our consciousness from within."

If this shift in metaphysical foundations were to be made, much of experimental psychology would have to be revised since it tends to postulate an inappropriate determinism. Clinical psychology, transpersonal psychology, and the social sciences would tend to develop two strong emphases — one, disciplined explorations of inner experience; the other, social science as a participatory collaboration of researcher with researchee.

Science has had a hard time including the self in its analyses, primarily because when you try to explain the self reductionistically, you are no longer dealing with it as a whole entity. The puzzle presented to contemporary science by the evidence of a non-reducible self, is in the oneness view no longer a fundamental puzzle.

Reports of nonordinary states of consciousness have, by and large, been considered by modern science to be aberrations or pathologies. However, in the oneness view these are potentially explorations of the whole, of the "Great Mysterious," to be employed judiciously, with the lessons thereby learned to be shared and added to the totality of scientific knowledge.

The resolvability of major puzzles in the physical, biological, and human sciences

With this concept of an extended science some previously unanswerable questions such as, "Does consciousness exist?" and "Is there evidence of teleological influence in evolution?" are seen in a new light. The ontological oneness assumption implies that since I find consciousness and sense of purpose in myself, they are not to be presumptively ruled out of any other part of the universe.

Professor Lynn Margulis, whose research has directed attention to the key role of microbial cooperation in evolution, told an audience at the 1991 annual meeting of the American Association for the Advancement of Science that bacteria and other one-celled animals react as though they involve something akin to consciousness in the human being. If something like consciousness is to be found in all living organisms, is it utterly preposterous to postulate (as does her colleague, Nobel laureate George Wald, 1988) a substratum of consciousness pervad-

ing the entire physical universe? Or for that matter, a superstratum?

One of the key puzzles in science has been how to deal with "downward causation" (Campbell, 1974; Sperry, 1987). Present science tends to assume the adequacy, for scientific explanation, of reductionistic "upward causation." But "downward causation" is consistently implied in our ordinary understandings of such matters as an organ to serving the needs of the organism, or human consciousness as agency. The assumption that reductionist "causes" should account for everything has been, it turns out, a prejudice of science in its present form. With the oneness assumption, there is no unique causal explanation for any phenomenon; cause is a function of context. In one context, reductionistic "causes" receive the primary focus; in another, volitional factors take center stage. Both kinds of explanation (as well as others) may be useful; no one is uniquely "true."

For example, consider the following four levels of cause:

Level 1. Physical cause (scientific cause in the usual sense).

Level 2. Biological cause (will to live, reproductive drive, evolutionary drive, etc., in the human as well as other biological organisms).

Level 3. Volitional cause (conscious and unconscious will and choice in humans and perhaps other organisms).

Level 4. Intuitional cause, "inner knowing," spiritual yearnings.

All four of these operate in our lives, and experientially they are all qualitatively different. They seem to lead to four different realms of science: physical, biological, cognitive, and spiritual (say). Each level has its own appropriate kind of cause; they operate simultaneously, and neither alone nor together do they provide a "complete" explanation, that is, a goal to be sought only in the deep understanding of the oneness.

One of the puzzles listed above is the self-organizing tendency of living systems (autopoiesis). This self-organizing tendency can be observed in myself as well as in nature; it is characteristic of the whole. Reductionistic arguments, including the emerging science of complexity, will no doubt come to illuminate the mechanisms of self-organization. However, a biological science that starts from the assumption of a unitive universe may add to this observations

and understandings that profoundly enrich the picture.

Another controversial puzzle is the apparently teleological manifestations in the evidence of evolution. But as I experience in myself creative and purposeful urgings, I cannot *a priori* rule those out in any other part of the whole. It is not necessarily naive anthropomorphism, for example, to see evidence of creative experimentation in the fossil evidence of the appearance of new species, or phyla.

Another of the puzzles is nonlocal causality. It appears that one part of the universe can be causal with regard to another in a way that involves neither a "field" in the usual sense nor propagation at the speed of light or below, as would seem to be required by relativity theory. It was only the physicalist and reductionist assumptions that made nonlocal causality into an anomaly. The universe is whatever it is found to be through open and impartial scientific inquiry; if it includes nonlocal causality, we better learn to live with that fact. In human experience, the assumption of local causality appears to be valid only when certain types of situations are set up.

Understanding the extreme anomalies

The more extreme puzzles in science are referred to as "paranormal" phenomena. One class of these was described above as "meaningful coincidences." With the oneness assumption, because of inherent connectedness, meaningful coincidences are to be expected. There are indeed interesting questions here, quite worth extensive exploration. For example: Why don't we experience "meaningful coincidences" more often? What is it that creates the apparent separation between ourselves and others, or the world? Why do we seem to have a reluctance to manifest what we presently (and erroneously) term "paranormal" phenomena? Should this reluctance be overcome or respected?

More generally, the issue of "anomalous phenomena" has a long history within science; the study of it has sometimes led to major restructurings of scientific areas. But much effort has been spent throughout the history of "separateness-based" science attempting to explain away, or dismiss as fraudulent, reports of phenomena that don't "fit in." "Meaningful coincidences" or any other class of inner experiences that have been reported, or of phenomena that have been observed, down through the ages and across cultures (like "firewalking"), apparently in some sense exist and have a *face validity* that cannot

be denied. A oneness-based science holds forth the promise of accommodating *all that exists*. (There are many subtleties, of course. Entire societies can perceive things that observers from other societies do not, so it is necessary to be very cautious about claiming that some class of experiences is universal, even in potential. There is a tendency among some persons today to regard it as a mark of New Age distinction to be willing to believe almost anything. It is not total gullibility we seek, but rather new agreements about consensual validation.)

One of the most perplexing classes of anomalies includes "mind over matter" and the "mind-body problem." Again, these are paradoxes only because of the metaphysical assumptions of the modern view. If we start from the oneness assumption, then it is obvious that mind and matter are interacting all the time. The interesting question is how isolated situations can be set up (such as the familiar scientific

In the proposed unitary science, conscious awareness, unconscious processes, volition, and the concept of the self do not present any fundamental contradiction.

experiments and technological applications) in which the effects of mind are locally negligible or ignorable. The still more interesting question, sociologically, is how we ever persuaded ourselves that those situations represent the norm, and that the totally ordinary interaction between my mental volition and physiological response is an anomaly — a "mind-body problem."

Science has had a hard time dealing with altered states of consciousness, including particularly those states traditionally sought out in a spiritual or mystical context. In the proposed unitary science, conscious awareness, unconscious processes, volition, and the concept of the self do not present any fundamental contradiction. Nor does the recommendation, in the "perennial wisdom" of the world's spiritual traditions, of an inner search involving some sort of meditative or yogic discipline, and discovery of and identification with, a "higher" or "true" Self that is beyond the physical realm but is nevertheless real.

William James proposed a science based on the concept of "radical empiricism"; empiricism be-

comes "radical" when it "refuses to admit into its constructions any element that is not directly experienced, nor to exclude from them any element that is directly experienced." (Taylor, 1991; Burkhardt, Bowers & Skrupskelis, 1976) The holistic assumption appears to make possible James's goal of a more adequate science: one that includes all the findings and powers of reductionistic science but puts them in a different context, in which nothing of human experience is excluded by the tyranny of founding assumptions that masquerade as ineluctable axioms or valid scientific findings.

Social, economic, and political implications of an "extended science"

The worldview of unitary science has a place for values, meanings, purpose — for all that makes human life truly human. Our present inability to achieve consensus in this area stems from the downgrading of religion by the successes of science and technology.

The assumptions underlying the paramountcy of economic and industrial institutions in modern society, and the dominance of economic and technical rationality and values in decision making, have been strongly influenced by the materialistic scientific worldview, and hence are subject to revision.

If science is reconstructed on this new metaphysical base, then the presumed goals of individual lives and of human societies, the values that cause communities to cohere, will all appear differently in the new worldview; the intimidation of the arts and humanities by a powerful science will be reduced; the confusion of means (technology, the economy) with ends will be lessened.

The present global dilemmas will be seen as largely rooted in the underlying economic assumptions reassessed in light of a new oneness worldview; thus new approaches toward their resolution will be evident. We can anticipate a shift from the predominance of economic rationality to what might be termed *ecosophy* (*eco*-habitat + *sophia*-wisdom) — wisdom about our total environment.

Conclusion

We are entering a new era. The scientific worldview is so powerful and prestigious that it may seem presumptuous indeed to challenge it. Yet however well it may have served to generate new tech-

nologies to manipulate our physical environment, it has never fit with those aspects of human experience that we most deeply cherish — our conscious awareness; our sense of intimacy with nature; our sense of intention and volition; our sense of values and meanings that transcend the pragmatic; our aesthetic, moral, and spiritual sensibilities. Only recently has it begun to be apparent that the entire impressive edifice of science is founded upon metaphysical assumptions that now need to be questioned.

Not that present physical and biological science would be discarded, but that they would be found to be an unsuitable source of a complete worldview because they are based on only part of human experience. In other words, although the present reductionistic science would continue to be available for the purposes to which it is suited, it would no longer have the authority to imperiously insist that we humans are here, solely through random causes, in a meaningless universe, and that our consciousness is “merely” the chemical and physical processes of the brain.

Modern society has made a grave mistake in assuming that ultimately, reductionistic “scientific” causes can explain everything. One should not expect reductionistic science to comprise an adequate worldview. The context of reductionistic science is the desire to gain control through manipulation of the physical environment; within that context its description of “upward causation” works amazingly well. However, serious problems arose when society changed that context and attempted to elevate that kind of science to the level of a worldview. That is when puzzles arose like “free will versus determinism,” the “mind-body problem,” and “science versus religion”; more important, that is the origin of modern society’s fundamental confusion about values, meanings, and purposes.

It is now time to undo this mischief, without losing any of the real gains that modern science has unquestionably brought us. Education has a significant role in this process.

However, education is basically a conservative activity. Its functions include conserving and passing on the knowledge and wisdom of the past, as well as preparing the student to deal with a challenging future. Educational institutions should not be expected to lead society; they can move only as fast and as far as their constituencies will support them. They cannot operate from a worldview that may be emergent but is not yet widely accepted among those constituencies.

But they *can* encourage questioning. As we have seen, there is good reason to question even the most fundamental assumptions underlying the institutions of modern society. The best students are already questioning; they will trust the educational activities that legitimize and encourage healthy questioning, and they will opt out of any attempt to indoctrinate them with a set of beliefs that are no longer working. The proper function of education in these critical times is to assist in the right kind of questioning.

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Keeping Wonder Alive

Ellen Doris

The greatest challenge of all teaching, and of science teaching in particular, is to enhance students' wonder about the world around them and help them pursue their own curiosities to make learning an interesting, lifelong process.

Something Rachel Carson (1956) wrote has stayed on my mind. She was writing for parents, but her message is one for teachers as well.

A child's world is fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood. If I had influence with the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things artificial, the alienation from the sources of our strength.

If a child is to keep alive his inborn sense of wonder without any such gift from the fairies, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in. (pp. 42-45)

I was just out for a walk in the woods with my five-year-old. It took us the better part of an hour to cover less than a quarter mile. "Look here!" he began, picking a little stone from the path. "See? It's white!" A few steps later, he stopped again. "Look at *these* rocks! They're full of *holes*!" We inched along, stopping at one point to exclaim over big rocks, at another to look at some flat ones, at yet another to examine a fresh specimen of the kind with holes. At five, the world is indeed full of wonder and excitement. Parents and teachers of preschoolers note this with remarks like "She notices everything!" "He asks questions all day long!" or "Everything interests them!" Observant and curious, little children seem to find few things too ordinary and dull to inspect, puzzle over, and delight in.

Adults often speak differently of older children. "All they want to do is watch TV," is one familiar complaint, and there are others as well. A third grade teacher at a science workshop, intent on observing a grasshopper, offered, "I find this interesting, but truly, if I put this out in my classroom, there are kids

Author's note: My thanks to Bob Strachota for allowing me to discuss his work with second graders and leaf impressions, and to the children who contributed their artwork.

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who would look at me and say 'A grasshopper. So what?'" "Sure, my kids notice things," a colleague spoke with frustration, "but that's as far as it goes. They never pursue anything, investigate, find out more!" If these remarks are any indication, it seems that "the boredom and disenchantments of later years" can set in as early as seven or eight.

I've always felt that making science an important part of classroom life is one way teachers can help children feel excited about their surroundings, and discover the extraordinary in everyday events (Fig.



Figure 1. This drawing was made by a seven-year-old boy one spring when exploring the woods was an important part of his science work at school, as well as a favorite past-time at home. For him, sunshine and singing birds were an extraordinary ordinary event.

1). But teachers and children alike have let me know it's not all that simple, for science class can be a place to feel stupid instead of excited, a time to "tune out" instead of wonder.

The teachers I've met don't want their students to be disengaged and disenchanted. No matter how worried they are about "preparing" students (for adult life or next month's standardized tests), when asked what they want children to gain through science study, they respond with conviction and passion:

"I want them to be curious!"

"I want them to be lifelong learners."

"I want them to be more aware of the natural world ... and for that awareness to enhance, not diminish, their sense of wonder."

"When they come upon something new, I want them to have different avenues open for learning about it."

"A healthy respect and responsibility for nature — that's what's important to me."

"I want them to learn science can be fun!"

But convictions alone don't create lively classrooms where students are curious, self-motivated, learners. It's not merely a teacher's companionship that fosters curiosity and excitement in students; rather, it's a particular kind of companionship, that of a wondering adult, one who can strengthen a child's sense of wonder by sharing her excitement and helping her pursue her curiosity.

How can teachers learn to offer this sort of companionship to children? Reflecting on our work with them is an important part of the answer. Studying our classrooms, we begin to see ways we have encouraged children to find excitement and mystery in the world around them, and ways we have hindered them. This understanding can inform our practice so that, even without the good fairy, we can help children hang on to their sense of wonder.

I would like to share some events that occurred in classes I taught or visited that were particularly instructive for me. Your own practice will provide many more.

Undoing disenchantment: Learning to wonder

One year my co-teacher suggested I introduce our class of second and third graders to crickets. Crickets, we thought, would be wonderful to study. They were common and simple to raise, so it would be easy to collect and keep enough for everyone in our class to observe them at the same time. Furthermore,

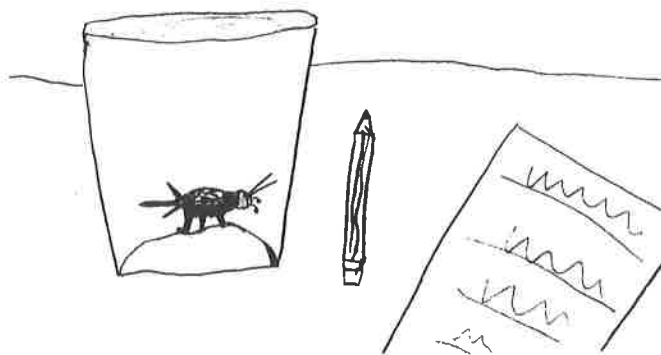


Figure 2. A cricket in a plastic punch cup. Drawing by an eight-year-old girl.

they were fascinating! We were enchanted with their singing, grooming, and the way they moved, and we were sure the children would be, too. I hopped around my garden collecting, transformed cracked aquaria into cricket cages, and gathered books and other resources in preparation for our study. I fashioned "temporary housing" out of plastic punch cups and cardboard, so that each child could look

closely at an individual cricket during our first sessions (Fig. 2).

I did not prepare, however, for the children's varied responses to the crickets. Though many observed the insects eagerly, making drawings and discussing what they noticed with friends, a significant number approached their work with a sense of duty rather than interest. Worse still, some could not even muster a sense of duty. Five minutes after beginning their cricket study, they were done!

I was puzzled. I knelt on the floor next to Ricky, the first child "finished."

"What did you notice about your cricket?" I inquired.

"Crickets are insects," he replied.

"Yes," I agreed. "What has yours been doing?"

"Nothing," answered Ricky.

We went around like this for a minute, me trying to come up with questions that would help me discover what, if anything, Ricky had noticed about the actual cricket in front of him, and Ricky fabricating answers or supplying information from books. Little he said matched the cricket before us, but Ricky did not seem to notice any contradictions. Conversations with several other children revealed that the live insects had not captured their attention, either. I was discouraged. I felt I had failed to capture everyone's attention. The disenchanted children weren't likely to get interested in crickets unless I could get them to look — really look — at the animals in front of them. How could I get them to look?

I couldn't think of an answer, so I simply went ahead distributing crickets for observation at the beginning of each afternoon, and collecting the class for a discussion at the end. At first, the discussions were dominated by the children who had immediately taken to cricket-watching.

"My cricket has two tails," one girl reported.

"Mine does, too," confirmed a classmate.

"I counted three tails!" another chimed in, surprised at the difference.

The meeting dissolved into discussion and argument as children compared notes. The curiosity of children who had not noted any tails was aroused. Did crickets have tails or not? And how many did they have? The way to settle these questions was to

return to the crickets for another look, so off the children went to do exactly that.

As days went by, other contradictory or amazing observations were brought to our meetings. Carla noticed that some crickets chirp, but not all of them. Darcie saw her cricket put its antennae in its mouth. John thought he had seen a cricket laying eggs! I began to notice a change in the room. Many different children now contributed at meetings, and as far as cricket-watching went, those who at first appeared bored were beginning to get interested. Ricky was able to check information in books against his own observations. He figured out that his cricket's feet pointed outward when it was "in a resting position," and read that the spines he noticed on its strong back legs "help him when he jumps."

Children need time, experience, and perhaps a success or two in order to invest themselves in a new project.... They have to observe carefully in order to notice something amazing or puzzling in order to wonder....

This experience made me think about interest, and wonder. Though some children needed only to look at a cricket to start exclaiming and puzzling about it, many needed time and exposure to the questions and ideas of others to get involved. I puzzled over the difference between these two approaches. What was going on for children during that first session? A number of them, somehow, could focus on the crickets long enough to identify anatomical features or behaviors. Furthermore, they drew satisfaction from collecting this data, and when questions arose, felt able to tackle them. Other children, perhaps, found the crickets so familiar and unimportant there seemed to be no point in considering them. Or perhaps the crickets were so small and unfamiliar they were difficult to approach. There may have been children in the class who were unused to raising their own questions, or lacked strategies for pursuing them.

Whatever the case, I felt an empathy for my "bored" and "done" students I had not found on the first day of our study. Though I had been frustrated with them for failing to respond immediately to the

terrific lesson I had planned, I now realized they needed time, experience, and perhaps a success or two in order to invest themselves in a new project. They also needed to listen to the enthusiastic reports of classmates and to watch how others went about their work. It occurred to me that committing to the serious study of a cricket — or anything else, for that matter — required some confidence and competence. Children had to observe carefully enough to notice something amazing or puzzling in order to wonder, and to believe there were things worth finding out in order to invest energy in observation, discussion, or any other aspect of inquiry. Not only did they have to believe there were things worth finding out, but they often had to tackle hard work simply to try to find out.

One aspect of the companionship I needed to offer children as their science teacher was becoming clear. When confronted with boredom, I needed to drum up patience and empathy. Boredom is sometimes a legitimate response to inappropriate teacher demands, but other times it speaks more to children's inability to focus, lack of independence, or fear of tackling unfamiliar work. Moving children from boredom to wonder in this case required fairly straightforward work on my part. I continued to schedule time for cricket-watching, saying, in effect, "These crickets are interesting. There's still more we can learn about them." And I continued to keep a discussion on the floor. The fascinating, often conflicting observations that were reported drew children deeper into the work, fueling further investigation of the crickets and a desire to understand them.

Following up on wonder

Learning about the object of our wonder rewards our curiosity. When children raise questions about the world around them and teachers encourage them to pursue understanding, we encourage further wonder as well.

I once chose to study birds with a group of eight-year-olds. The early work of several students stands out in my mind, because it was marked from the start by wonder, and because the children involved derived such satisfaction from their self-designed research. Keeping self-motivated, interested children company is usually easier than dealing with disenchantment, but our companionship is nonetheless important to them, and useful to reflect on.

Nina was quite taken with our stereo microscope. It was a new tool to her, and she was excited by the

world it revealed. Once I showed her how to adjust the focus, she parked herself in front of it. Since we were studying birds, I had put a collection of feathers out for the children to explore. Nina chose a beautiful green parrot feather with red and yellow markings to observe. I wasn't surprised that it caught her attention, or that her microscopic examination of it kept her occupied for a full half hour. But I *was* surprised when she plunked herself down at the microscope again the next day and continued to study the very same feather! I was curious and inquired about her work. Nina explained that she had discovered something about the green color of the feather. When she looked at it without the microscope, the feather looked solid green. But under magnification, she could see that wasn't true. The feather actually had only a tiny bit of green, located in particular places. The rest of it appeared black. I took a look through the microscope, and saw the feather exactly as she had described it. I encouraged her to draw what she had seen and to check out the red and yellow markings on the feather as well.

Nina continued her examination of the parrot feather for nearly two weeks. Her excitement grew as she observed the various ways different colors were located, or constructed, in the feather. She discovered that not only did colors appear different microscopically, but they "behaved" differently, too. Some colors stayed the same when the feather was tilted or held up to the light, while others changed or "disappeared"! My excitement grew along with Nina's. I

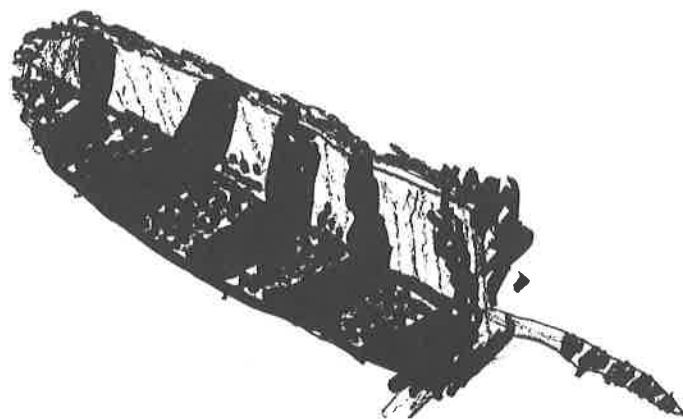


Figure 3. Turkey feather. Painting by eight-year-old girl.

listened to her daily updates, occasionally supplying a term or asking a question to help her clarify her thoughts. Her interest in the microscope had led to

some interesting observations, but more important, her observations fascinated her, and she had been able to pursue them.

Karen and Suzanna weren't at all taken with the microscope. They were drawn to our new art supplies. They were also attracted by the feathers and decided to try to "draw them." After they had been working a while, I went over to see how things were going.

"Look what we did!" They eagerly held out beautiful pastel pictures. Karen also held out her feather for me to see.

"See? I showed how it looks on this side, and how it looks on the other. On this side the colors are really bright, but when you turn it over, they're not."

"And what did you have to do to show that?" I asked.

Karen showed me the many different pastels she had used, the places where she had mixed colors, and how she had muted colors by rubbing her drawing with a tissue.

Day after day Karen and Suzanna got out the feathers. They rendered them with oil pastels, colored chalk, watercolors and tempera paints. Each time I checked in, they were full of news about the feathers as well as the particular qualities of the medium they had used (Fig. 3).

"See this spot?" Suzanna pointed out a light area on a dark grey feather. "When I first looked at it, I thought it was just one color, but look! Right at the edge, it gets a little darker; then it kind of blends in to the grey part...."

In both of these examples, children became interested in exploring the color of feathers, and without

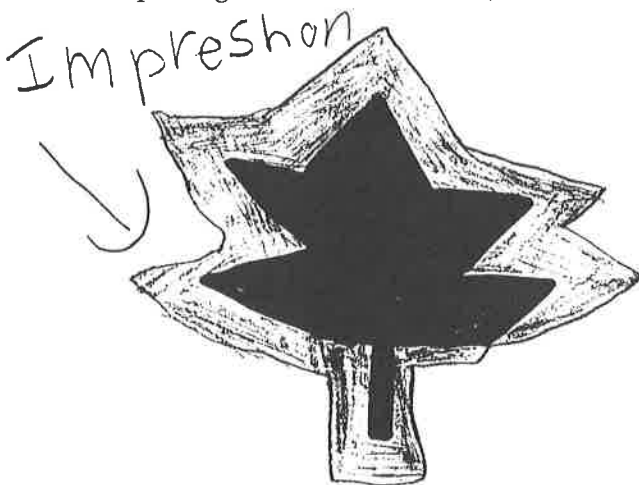


Figure 4. A leaf impression. Drawing by an eight-year-old girl.

a suggestion or assignment from me, they figured out ways to do so. I didn't need to get them wondering, I only needed to keep them company as they developed their projects. Perhaps the main thing I did was to let them know I was truly interested in what they were doing, thinking, and discovering. In Nina's case, my excitement may have been particularly important, for although she tried to explain her work to the rest of the class, they did not quite understand it. I'm not sure why a teacher's sincere interest in a child's work is so valuable; certainly these three girls were chiefly motivated by their own curiosity and the satisfaction they derived from observing, drawing, and thinking, rather than by an effort to please or interest me. But it must add to a child's pleasure and satisfaction when her own questions intrigue others as well, and when her sense of excitement and mystery is shared by her teacher.

Getting unstuck:

Moving from wonder to frustration and back

Of course, there are times when children raise questions they can't seem to make any headway with, and then the teacher's assistance, as well as excitement, is important. Some interesting science work was going on in a second grade classroom I visited this winter. Seven-year-old Janine had noticed something beautiful and mysterious at the edge of the woods where she often played at recess. Fallen leaves were frozen in the ice. The spectacular thing was, the leaves were not level with the surface of the ice, but several inches below it. They had, it seemed, melted down into the ice, leaving a leaf-shaped open space above them. After several days of studying these on her own, Janine brought her teacher to see them. He found them as beautiful and intriguing as she did, and summoned the rest of the class (Fig. 4).

There were many attempts to explain this phenomenon. Some children thought there was heat in the leaf. Because the leaf was hot, it could melt down into the ice. Others disagreed. How could a leaf that was sitting on ice in February have heat in it? The teacher asked if there was anything they could do that might help them understand more about the leaf impressions. The children decided to try to create their own leaf impressions indoors. If they succeeded, they thought, they would know how it worked.

The children froze pans of ice and put leaves on them, but this did not create impressions like the ones Janine had discovered. They tried heating the

leaves in a microwave and putting them on ice while they were still hot, but this didn't work, either. After many such experiments, the children had generated a long list of conditions that do *not* give rise to leaf impressions, and they were feeling stuck and frustrated.

The teacher realized that the children were trying to understand a complicated phenomenon, and that in addition to being inexperienced experimenters, they had little understanding of temperature, freezing, and melting. He suggested they investigate these related phenomena in order to collect information that might eventually shed light on the leaf

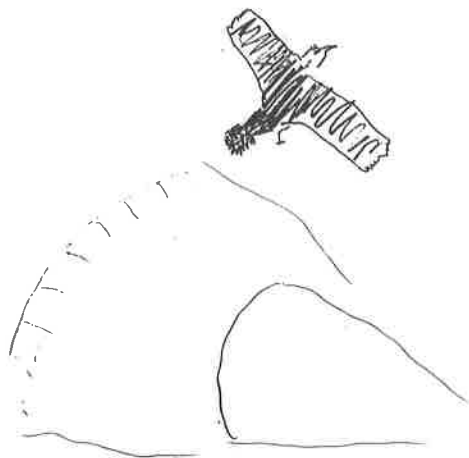


Figure 5. A soaring hawk. Drawing by an eight-year-old boy.

impression problem. The children were eager to get going and raised many questions that puzzled them. Do all liquids freeze? Does water freeze faster outdoors or in the freezer? Does salt water freeze? Is ice in the shade colder than ice in the sun? And how do you measure cold, anyway? The children continued to theorize about what combination of factors had created the leaf impressions outside, and to develop their understanding of freezing and melting generally.

I think it's the ability to take our own questions seriously, and get somewhere with our thinking about them, that helps us hang on to our sense of wonder. I want to make it clear that by "getting somewhere" I do not mean "getting the one right answer," but rather continuing to uncover information and ideas that inform us about the object of our curiosity. By steering children to experiment with freezing and melting, this teacher helped his class satisfy some part of their curiosity, while continuing to appreciate the more difficult mystery of the impressions.

Children need the companionship of a teacher who is listening to hear what they are wondering about and helping them figure out ways to investigate whatever that is.

Taking time

The same year that Nina, Karen, and Suzanna explored feathers, I saw, for the first and only time in my life, a kettle of hawks. A kettle of hawks is a collection of individual birds, all riding the same thermals, or rising columns of warm air, as they migrate. They circle around, high in the sky, and it's an amazing thing to see. I got to see this kettle, along with everyone else in my class, because Michael interrupted our tag game with a cry of "Bird!" (Fig. 5).

"Bird!" and "Bird break!" were signals anyone could utter, anytime something important was happening overhead or out the window. I don't remember how they came into being, but I do remember they were used with frequency. I also remember that no matter how engaged children were in an activity, even one as important as a soccer game, when someone yelled "Bird break!" we froze for a moment and looked.

Perhaps wondering can become a habit. Certainly that year it did. I think kids made a point of looking up and out the windows, expecting something interesting to be there. They were well rewarded for their vigilance. In addition to the kettle, we saw red-tailed hawks hunting over the playing fields, bald eagles circling over our sledding hill, crows chasing hawks, smaller birds chasing crows, and Canada geese migrating. Birds had become interesting enough that we were usually on the lookout for them, and usually willing to interrupt what we were doing to watch them for a while.

It takes time to wonder. Hurrying to meet a tight schedule doesn't leave room for it. It also takes a little spontaneity and flexibility, on our part and on the part of our students, for interesting things don't always present themselves at convenient moments. We can try to squeeze science into twelve minutes a day or eighteen chapters a year, but the cost will be high. We risk, for ourselves and our students, "the alienation from the sources of our strength." Better to slow down a bit and look around. There might be a big rock. There might even be one with *holes!*

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Holistic Science: Detachment and Participation

Stephen Edelglass

Only those aspects of reality that are quantifiable are accepted in the scientific worldview, but without the purely *qualitative* there is no meaningful concept of being human.

The quality of detachment from the surroundings is of great significance in the Western tradition. *It is within the context of detachment that Westerners intuit their sense of individuality and freedom.* However, many questions arise that are connected with the presumed separation between our selves and the objective world. And, as well, there are many important consequences of such a view. Perhaps the most important question is the epistemological one concerning how it is possible for human beings to bridge the gap between "in here" and "out there" to gain objective knowledge: how, within our consciousness, we can apprehend the intrinsic reality of the "outside world." And perhaps the most important consequences are connected with the increasing alienation human beings experience regarding all that is outside of themselves. At its most extreme such alienation can lead to human beings treating other human beings purely as objects, as things without an inner life.

Knowledge of the world of objects is, however, literally *meaningless* in the absence of an inner human context. It simply makes no difference whether an object is here or there, one or many, heavy or light, large or small, without a context of which a human being is conscious. By limiting scientific knowledge solely to that of objects, Western human beings gained their sense of individuality and, at the same time, rendered the world in which that individuality is expressed to be ultimately meaningless.

Emerson, in his essay *Nature*, put it this way:

[Man] is placed in the center of beings, and a ray of relation passes from every other being to him. And neither can man be understood without these objects, nor can these objects without man. All the facts in natural history taken by themselves have no value, but are barren, like a single sex. But marry it to human history, and it is full of life. (part IV, section 2)

The worldview of the Western scientific consciousness, in which the knowing observer is banned from the reality of the world she observes, is extraordinarily peculiar. The human being as scientific

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knower is, in Gilbert Ryle's words, a "ghost in the machine." By including in the scientific worldview only entities that are based on concepts which are quantifiable, nonquantifiable existences, such as those associated with the inner life of human beings, are eliminated from scientific reality.

Physical sense experiences that are quantifiable are known as the "primary qualities"; physical sense experiences that cannot be quantified — sense experiences that are pure nonquantifiable qualities — are known as "secondary qualities." Limiting the real to that which is based on the primary qualities is quite puzzling when we realize that there is no difference between the experience of perceiving primary quality phenomena and the experience of perceiving secondary quality phenomena. Color, a secondary quality, seems to inhere in the object just as much as does the object's primary qualities, its heaviness for example. And both perceptions are immediate givens in our experience when we turn an awake attention to the world. On what basis, we may ask, are some aspects of the world that are known through physical sense experience included in the scientific conception of reality, while others that are known in just the same way are not included?

Galileo laid the foundation of modern scientific methodology by including in the world of physics only those phenomena that were capable of being mathematized. He had the impression that quantities such as length, volume, and weight were conceptually necessary attributes of matter — that matter was unthinkable independent of such intrinsic characteristics. In contrast, qualities such as color and sound seemed to him not to be intrinsic aspects of matter but, instead, to be a product of the human senses.

This discrimination between characteristics that are thought to be inescapably intertwined with the essence of matter, whether or not human beings can apprehend them with their senses, and characteristics that "merely" depend on the senses was, of course, the basis for the historical distinction between the primary qualities and the secondary qualities. Primary qualities were thought to be actual properties of matter, and secondary qualities were taken to be aspects of the perceiving organism when it is stimulated from without.

The primary qualities are the qualities from which the concepts of an object are developed. According to the naive physical worldview, they are the ultimate reality of the cosmos. Consequently, inner experiences of human beings, although valid and of inter-

est to us, are not the content of ultimate world realities. In fact, our inner life is, according to these same ideas, often simply taken to be a metaphenomenon of the objects (atoms) of which we are considered to be made.

The concepts of *objective* and *subjective* have their roots in these ideas. Since what is ultimately real is taken to be an object, objective knowledge is to be striven for in science. And, since scientific knowledge is meant to be public knowledge, public discussion generally is acceptable only in the guise of objectivity. Although it is true that the contents of our inner life are important to the private individual, they are not constituents of the objective world.

The nature of an object is that we take it to exist in three dimensional space independent of our own existence. This separation of our own selves from the object of study is one of the hallmarks of the claim of science to objective knowledge. Such knowledge is commonly assumed to be of perceptual (or theoretically perceptual) entities whose existence is independent of our own selves as scientific knowers. Thus, a prized characteristic of scientific methodology has been the separation of the scientific observer from the object of concern. Detachment, passivity, impartiality, and noninvolvement with the studied object is cultivated, while passionate engagement, activity, interest, and involvement with regard to the inner mental processes of gaining knowledge are taken for granted.

The new book *Matter and Mind: Imaginative Participation in Science*,¹ which I co-authored with Georg Maier, Hans Gebert, and John Davy, shows that the so-called primary qualities have their basis in sense perception just as much as do the so-called secondary qualities: The primary qualities are conceptually untenable without physical sense experience. However, the senses upon which the primary qualities are based are touch, motion, proprioception (or the somatic sense), and balance. Rather than being turned outward to the world, as are senses such as sight and hearing, these four senses tell us about our own personal bodies. Although human beings are largely unaware of the workings of these senses — and are not very conscious of their inner bodily processes — these senses provide the experience upon which the concepts of object, space, motion, and force or energy are developed. But these are just the concepts upon which the reality of the scientific worldview is based.

¹Editor's note: A review of this book by Ron Brady appears in the Book Review section of this issue.

It follows that *the methodology of science is based, in part, on an unconscious projection of the body senses onto the outer world.* By eliminating all but body sense phenomena from the so-called real world, pure quality — that is, quality independent of quantity — was eliminated from that world, too.

From the point of view of the physiological ground of knowing, there is no necessity for limiting science to concepts based on the body senses. Or, to put it another way, the limitation of science to those aspects of the world that are amenable to measurement is not necessitated by the physiological characteristics of the human capacity to know the world. Although limiting scientific concepts to those relating to measurable properties leads to seemingly independent means for testing the correctness of a theory, at the same time such a limitation eliminates aspects of reality from the scientific worldview that are just as valid as are the mathematical ones. For example, once it is recognized that the epistemological ground for the concept of weight is physiological, in the same way that the epistemological ground for the concept of blue is physiological, it then follows that the statuses of weight and color as real existences are identical. Blue is as real as is weight. Furthermore, when the fallacy of the primacy of that which is object-like is recognized, then the meaning of scientific theory can be seen to lie in determining relationships among phenomena, not in constructing object-like metaphysical entities such as atoms that are used to “explain” phenomena. Science can then be expanded to include relationships among qualities — the color wheel for example — as well as quantities. Such a phenomenological scientific methodology is developed in *Matter and Mind*. In this way the worldview of science can become a holistic one, one in which the human being is integral to it, and therefore a view that is humanly meaningful.

At its deepest level the problem is (once again) that since, within the contemporary scientific view, what is ultimately real has the characteristics of a “spatial thing,” there is therefore no scientifically recognized reality of being human other than as an object. But how is it possible to have a truly meaningful education of human beings if at its core there is no reality basis for recognition of the intrinsic nature and value of what is human? At least to the extent that contemporary human beings turn to science for the answers to questions such as this, it is necessary to reexamine science itself with regard to just such questions.

Above I pointed out that the content of science lies in its establishing relationships among phenomena, not in hypothesizing metaphysical entities (models) to explain phenomena. In fact, physical reality is known through bringing together phenomena and their appropriate relationships. Theoretical models are seen simply to be imaginative tools employed to help establish the appropriate relationships among phenomena. If this insight is taken seriously, then a phenomenological science that is truly worthy of the adjective *holistic* is possible.

Since a scientific methodology in which phenomena are the objects of inquiry studies the contents of human perception, the role of the human knower cannot be ignored. And if one of the goals of such a science is to remain aware of the manifold of phenomena from which a single phenomenon to be studied is abstracted, then the relation to the whole of the world can be maintained.

Phenomenological science in education

Because “wholly detached science” is at the core of Western beliefs — often unconscious — about the nature of knowledge and the nature of reality, its societal consequences are pervasive. This is no less true in regard to education than it is in other areas of public endeavor. All too often schoolchildren are presented with tasks and activities that are inherently meaningless — even though such tasks may lead to entrance to prestigious colleges and universities followed by successful, well paying careers. Schools are biased toward totally objective knowledge. This bias expresses itself in coursework that leads to answering objective test questions. It expresses itself, even in very early elementary education, in teachers using computers without a sophisticated understanding of the meaning of theoretical models, with the consequence that results are uncritically accepted because the models are naively taken for granted. It expresses itself in the widely held opinion that cognitive value is not present unless it can be tested. It expresses itself in language learning where value is seen solely in a utilitarian context, rather than as a means of soul enrichment. One can go on endlessly with such a list.

At the Green Meadow Waldorf School in Chestnut Ridge, New York, physics is taught according to a phenomenological scientific methodology along the lines sketched earlier. Whenever possible, the study of particular physical subjects starts with observation of nature so that the students are aware that focus on one phenomenon always involves a choice

to ignore many others. For example, starting the study of optics by looking at optical phenomena in a pond brings students the awareness that reflection and refraction cannot be observed at the same time and position; this is in a manner somewhat analogous to the coupled properties of Werner Heisenberg's uncertainty principle. Because the students do not look behind phenomena for explanations in terms of hypothetical spatial entities, nature as a humanly meaningful concept is retained within the reality structure of science, and the way to a science of ecology in which the intrinsic value of nature is respected is not foreclosed. Mathematical relationships among phenomena are gained without recourse to intermediate models and often in more elegant form than that of the usual high school fare. For example, again using the pond as a starting point, the law of reflection is drawn directly out of the experience of observing the properties of the reflected space within the water and is expressed as a symmetry transformation, rather than using the fiction of light rays. The students directly participate in the phenomena they study rather than being abstracted from them.

Some years ago a student of mine, now a Ph.D. in physics, came to see me after his first semester as a physics undergraduate. He described to me his shock upon taking his first examination and discovering that it was all problem solving. He was very excited by what he had been studying and had spent a lot of time thinking about and working with the concepts involved. He had expected that some part of the examination would pertain to phenomena and the development of concepts appropriate to them. My student was concerned, when he came to see me, about whether or not he could maintain his interest in and love of physics if being a successful physics student meant focusing his attention almost wholly on problem solving with its often utilitarian implications.

The science educator is faced with a difficult dilemma. If the problems with and consequences of contemporary scientific methodology are recognized as valid, then it is imperative that the way science is taught (as well as practiced) be radically transformed. But how can such a radical change be brought about at the school level if that same recognition is absent in the scientific community itself? Of course, to the extent that education is a profession, the goals of educators emanate from the context of that discipline and the insight of the individuals who

practice it. Specifically, educational practice should not rest on external motivations. Nevertheless, the actuality is that most curricula are externally imposed. The goal of the Green Meadow Waldorf School is the education of free human beings. In order to accomplish that, the teachers are themselves professionally free. It was within this context that the holistic physics curriculum referred to above was developed.

An important aspect of phenomenological science is that human beings no longer feel compelled to practice science solely from a reductionistic standpoint. It is not intended that reductionistic science be "outlawed." Instead, it is hoped that human beings will become aware that choice in the way we think scientifically is possible and that the choice about how we think about something can have pervasive consequences. Rather than viewing science as being value free, we can see that the way we choose to think about a problem in itself involves a moral choice, and so it behooves us to think in terms that are humanly appropriate to a question. In this regard I will end with a quotation from *Matter and Mind* (Edelglass et al., 1992):

Just as personal isolation and alienation are the inevitable fruits of preoccupation with the microscopic atomic world, so do union and belonging surely follow from scientific concern with phenomena along the lines we have sketched. The first choice required our cultivation of the quality of detachment from phenomena while, at the same time, calling for passionate participation in the inner activity of cognizance. The second choice calls for actively attending to and participating in phenomena. And just those qualities which enable us to participate in phenomena — selfless interest and involvement in the single, individual, specific other — make for a healthy social life and rich interpersonal relations. (p. 128)

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The Outdoor School: Reverence and Connectedness

Dilafruz R. Williams

As an environmental education program, the Outdoor School provides sixth graders the experiences of interconnectedness with nature and with others. Learning about ecology where it can be learned best — outdoors — this six-day program provides the vitality and vigor of science while simultaneously addressing the spiritual dimension of our lives.

The initiation ceremony that I witnessed began in March when Ms. Lewis's sixth graders were presented a slide show of the Outdoor School organized by the Multnomah Environmental Education Program in Portland, Oregon. The colorful slides and their rhythmic motions kept the 25 students in this inner-city school unusually alert and interested; they were trying to absorb the essence of the experiences of a distinctive outdoor school setting that they were to encounter within six weeks. Forms, attractive brochures, a detailed *Student's Handbook* (1990) and *Student Preparation Workbook* (Anderson, 1984) on environmental science were subsequently distributed to the class. Bustling, chatter, questions, and energy permeated the classroom.

In existence since 1966, the Outdoor School has been serving students from eleven school districts in Multnomah County, Oregon. These districts range from rural to urban with a diverse student population across and within school districts, in terms of socioeconomic status, ethnicity, and race. With a population of about 56,000 students, the Portland Public School District is the largest urban school district in the county; it has a number of schools in inner-city neighborhoods.

One such school, Bellevue Middle School, was the site where my observations of Ms. Lewis's sixth grade class began four months ago. I was interested in examining the nature and formation of communities in this particular inner-city middle school in Portland. The gang-infested neighborhood of Bellevue had been confronting not only poverty but also the violence and race-related conflicts that have become the norm of many inner-city areas. This posed a challenge to those educators who were as much

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concerned about building student relationships as they were in what they taught. I had selected Ms. Lewis's class because she used cooperative learning to address the needs of her academically and culturally heterogeneous student population (48% of the students were nonwhite; 70% needed special academic and emotional assistance; a majority of the students were provided free lunch). During observations, Outdoor School came as a surprise to me, providing a flavor that was unanticipated yet of relevance to my interests in the connectedness of urban adolescents.

The initiation ceremony

While reflecting on the preparation for Outdoor School, it appeared to me that Ms. Lewis's class of sixth graders was initiated into a mode of thinking, feeling, and acting, in keeping with reverence for the *sacred*, i.e., nature. Having heard about the Outdoor School from their parents, siblings, or friends, the sixth graders were nervously entering a rite of passage, embracing a ritual of environmental education that would weave and bind them with over 150,000 students who had had similar experiences in the past. I associated the distinctiveness of this experience to a ceremony because of the excitement and the somewhat zealous engagement of the students for an experience that they sensed was distinguished from their regular schooling and normal life.

Diligently pursuing the knowledge base portrayed in the materials they had received, for six weeks Ms. Lewis's sixth graders prepared daily for Outdoor School with the integration of natural science in the regular curriculum. With tremendous excitement, many of the students began to devour the curriculum materials that were to become part of their classroom discovery and discourse. They learned about four major natural resources — animals, water, soil, plants — presented to them as *the amazing animals, the world of water, the earth beneath us, and plants for life*. The students began to realize that they needed to comprehend the ecosystem that they were to inhabit shortly; thus they surveyed and read maps, learned facts related to the four resources, discussed ecological concepts such as *habitat, adaptation, human influence, homeostasis, diversity, community* among others, sketched, labeled, asked many questions, and were engaged in a world of curiosity and wonder as environmental science brought vitality to the classroom. The process seemed to provide credence to Green's argument that the roots of motiva-

tion were to be discovered in one's capacity to wonder (Green, 1971).¹

The anticipation of being not just outdoors but also at the Outdoor School generated an aura about that which is publicly known yet privately unknown. This heightened sense of the unknown was a stark contrast to the daily lives of a majority of these sixth graders who were exposed to street fights, violence, and gang-related shootings and activities in recent months. Furthermore, preparing for the Outdoor School seemed to me a refreshing alternative to the routine and repetitious experiences of their daily schooling; student disruption and boredom, which were commonly visible earlier in the classroom, were scarce. Instead, feverish enthusiasm invaded the classroom; this rather inexplicable spirit had been absent during my previous observations of the same class.

As the students worked cooperatively on projects to display on bulletin boards in the classroom, they were exposed not only to the facts of environmental science but also to a language embedded in connections. One of the manuals, the *Student Preparation Workbook*, opened,

If a person can understand the natural process, then he/she can also understand those factors that oppose the natural process....

As a human, you are totally dependent upon natural resources. The more you learn about natural resources, the more you realize the need to make wise decisions about their use. This is why you go to Outdoor School! (Anderson, 1984, p. 1)

In teaching students "environmental manners," the same workbook presented "simple rules," which were "part of *respecting* the land, as well as the plant and animal life" at the Outdoor School (Anderson, 1984, p. 2). Some of the rules were:

Stay out of streams and ponds for the sake of safety and conservation; leave all rocks/sticks/cones on the ground ... throwing these things scares wildlife and harms others; walk wherever you go ... quick movements frighten wildlife; practice your environmental manners ... leave the Outdoor School site in the same condition that you found it. (Multnomah Environmental Education, 1991)

As the days for outdoor schooling drew closer, students were reminded about the items they were to bring to the Outdoor School; special arrangements were made by Bellevue administrators and Ms. Lewis for students who could not afford to bring the articles. In addition to the generally expected items such as clothing, personal gear, sleeping gear, and equipment, one surprise object on the list was a bag

of soil for a "soil ceremony" involving tree planting on the last day. I wondered whether this was a symbolic undertaking that would likely provide the occasion for what Green called "rootedness" and "social memory" — both essential to the formation of conscience (Green, 1984).

The social dimension of this environmental education venture was significant for Ms. Lewis's class because it was going to experience the Outdoor School with four other sixth grade classes from different schools. Never having encountered the Outdoor School myself, I shared with these students their excitement, their period of gestation, so to speak. Finally, with the onset of the Outdoor School, Ms. Lewis and her students embarked on their journey restlessly awaiting their destination.

Brief description of Outdoor School²

Each year, approximately 6,500 sixth graders, and 1,400 high school students who serve as junior counselors, participate in the Outdoor School at five sites. The Multnomah Education Service District leased local youth camps located within 30 miles of Portland, for six to seven weeks in the fall and again in the spring, each academic year. These camp sites provided comfortable living facilities within the "outdoor laboratory" setting where students could be involved in the learning of natural science. Each site was staffed by instructional personnel, a site supervisor, four resource specialists (for soil, water, animal, and plant studies), six senior counselors (three men, three women), sixth grade homeroom teachers, a registered nurse, and cooking staff. The instructional staff worked with 20 to 24 high school volunteer cabin counselors to ensure a rich, 24-hour living experience where, without interruption, about 100 sixth grade students and their teachers would explore the forests, the streams, and the fields, during the week.

Under the auspices of the Multnomah Environmental Education Office, the Outdoor School was conceived as an environmental education program. It was believed that the study of natural resources — plants, animals, soil, and water — could best be learned in a natural setting, i.e., outdoors. However, unlike learning about these resources in one's schoolyard or a vacant lot, or on a field trip, the Outdoor School was unique in providing opportunities for students to live outdoors for an extended period of time. Being in residence with other sixth graders and undertaking the study of the four resources over a

period of six days provided students the potential for cohesive and thorough experiences rarely captured through short-term exposures to nature.

A number of high school students who had been through the Outdoor School when they were in sixth grade volunteered for junior counselor positions. Resource specialists, senior counselors, and junior counselors went through an intensive six-day training period provided by the staff of the Multnomah Environmental Education Office. The counselors and specialists were instructed to manage a variety of components of the Outdoor School experience: teaching and covering the day-to-day scientific and environmental curricular materials, dealing with early adolescents, participating in recreational activities, handling discipline problems, treating emergencies, practicing a code of ethics that demonstrated respect for the environment and for the students, and managing the daily rituals which included wake-up time, breakfast, showers, skits, food, campfires, etc. Their training book provided many exercises, which indicated that this was far from a regimental overnight program. Instead, on teaching the staff, for instance, to listen and to feel, to provide help for participation in group interaction, to guide students through a process of discovery, and to use group language that was inclusive, the intent was to create an environment that was socially congenial and simultaneously respectful. The *Junior Counselor Handbook* (1991), which had guidelines and schedules for the day-to-day activities, also included many quotations for "daily survival" of the high school counselors, one of which was:

You never really leave a place you love, a part of it you take with you, leaving part of you behind. As this week ends, all the children you have touched will take with them the positive feelings you have given them. You have given yourself the same gift ... positive feelings and pride in yourself for having given so completely and unselfishly. (p. 57)

The overall training program emphasized the importance of connections and the practice of continuity between the natural environment and the human environment.

Having imbibed much about the Outdoor School, I pondered over what exactly would happen at Crestview, one of five Outdoor School sites where Ms. Lewis and her 25 students were situated. It was a crisp May morning as I drove through the Columbia Gorge in northern Oregon to Crestview; although the pinnacle was my eagerly awaited destination, the

grace and rhythm of the gorge made the journey its own reward.

Reverence and connectedness

A significant element of the Outdoor School as an environmental education program was reverence for nature and emphasis on connections with others and with nature. The instructional staff, including counselors, had been introduced to the students by made-up names, adopting some environmental element, for example, Willow, Alpine, or Fern. Similarly, the cabins had names of animals, such as Antelope, Bear, Cougar, Deer, Elk, Lynx, Moose, and Raccoon. At the Outdoor School each sixth grade class had a piece of land called a "study plot," which was several acres in size; the study plot provided access to stream or lake, many varieties of trees and shrubs, and an assortment of birds and animals. These plots, unlike the limitations of the classroom walls, provided opportunities for the use of all senses so that the students could grasp the reality and the beauty of nature that they had inhabited. At least six hours a day were spent in these nature plots. Moreover, night hikes were considered particularly suitable to experience the sounds of the outdoors.

The day after arrival, half of Ms. Lewis's class was instructed about *plants for life* by a team of junior counselors. The other half hiked farther downstream to study the *world of water*. Fern, a junior counselor, was taking a group of four students from one station to another, teaching them about the plants in the woods; they gently touched the moss — "gently," she emphasized, they were alive and could feel everything; they examined sporangia on ferns; they studied decomposed logs that had fungi and insects; they identified shapes of leaves; they examined wildflowers; and they wondered why the vegetation seemed different from the growth near their cabins. Magnifying glasses were the only equipment that the students carried. While the somewhat detailed examination of the fauna was undertaken, what was most important for Fern, it seemed, was to enable the students to perceive the "whole" picture: See where the light is coming from. Why do you think this twig is bent this way? Why are these creatures crawling away from us? Let's find out what is growing in the shade of this tree. And many more questions directed at keeping the minds of Yolanda, Daniel, Duran, and Cathy active and alert.

Fern's intent for the entire two-hour block was to encourage and persuade the four students to see the

interrelationships of plants, animals, and the environment in which they lived. Once, in moving from one station to the other, a huge nurse log was blocking their "short route." Daniel, who seemed in a hurry, was about to climb the log to go to the other side; but Fern explained her preference for "environmental manners," whereby they were to preserve as much of the natural ecosystem and not disrupt it as far as possible. Tramping on the decaying log and the surrounding rotten leaves would harm not only the seedbed of plants but also the creatures living within the particular community, she explained.

Interestingly, Fern was also astute about keeping the group together. Her use of "we" language was especially evident. If Yolanda strayed from the group, Fern would encourage the group to wait and request one of the members to "bring our group member back since we are incomplete without her." This "we" consciousness and inclusivity on her part was infectious, since the students did look out for one another, waiting, showing interest in others, taking turns, and thinking of a group presentation about what they had learned with Fern, for the rest of the sixth graders. Not all of the other junior counselors measured up to Fern's standards for what I considered was a conscious and deliberate attempt at forming a community. She had loved Outdoor School when she was a sixth grader, and had come back twice during her high school years. In presenting the theme *plants for life*, she was encouraging her team to seek connections not only among themselves but also between themselves and nature. If Duran pointed at the dewdrops or a spider web, the group would be allowed to stand in silence to absorb the beauty of the moment.

While these scenarios do not fully capture everything that was experienced by Ms. Lewis's class, they highlight the essence of the Outdoor School. Along with academic goals, certain attitudinal goals were addressed. In learning about soil composition, soil erosion, topography, climate, the web of life, shelter for animals, dependency, conservation, preservation, and many other curricular materials in environmental science, what was simultaneously addressed was appreciation for the natural environment. Reverence for nature was evident in the behavior of the sixth graders and the staff; more important, nature was not viewed as something "out there," but rather connections were sought between human lives and nature as the complex dependency of living things was explored and experienced.

Likewise, many opportunities were provided for the students to develop mutual friendships and a sense of community through social bonding. Consider for instance some of the daily functions of their living experience: family-style meals with students seated at round tables, taking turns to pass food, waiting until everybody at the table was served before beginning to eat; campfire sharing and songs; flag-hoisting ceremonies; public sharing of their learning with others; and group presentations.

Since all the sixth graders and staff associated with Outdoor School were engaged in a common endeavor at Crestview, the community though short-lived in space and time was to be connected in memory. The closing event, the "soil ceremony" for tree planting was indeed symbolic of "the sacred" as explained by one of the staff members. The soil brought by the individual students was mixed together, signifying bonding in spite of their differences. The soil was to provide nourishment for the tree to be planted. Representatives from each class shared their meaningful and memorable experiences of the past six days at the Outdoor School. And as a further expression of reverence to nature, the community of students and staff stood in silence, many with tears in their eyes, as a tree was planted — the epitome of an ethereal connection. "I return to the ground its original music," wrote Wendell Berry in a relevant poem, *Planting Trees* (Berry, 1984, p. 155). The finale of the Outdoor School presented a fitting expression for the renewal of the Earth.

Conclusion

Although the spiritual significance of the Outdoor School experience has been presented here, how relevant is this likely to be once the students return to their normal setting, one might ask. Before the sixth graders left for Crestview, Ms. Lewis had been provided a follow-up resource guide, *Linking Outdoor School with the Home Environment* (Cole & Gilfillan, 1983). Although many questions and exercises for follow-up activities were provided in the guide, the end-of-the-year school frenzy seemed to have gained prominence once the students returned to their familiar school surroundings. Yet to be collected are the data and narratives about the consequences of the Outdoor School on the moral fabric of the lives of the sixth graders. Nonetheless, this unique "schooling" in the outdoors might likely bring some of Ms.

Lewis's students to the Outdoor School as future junior counselors.

There might be a temptation to write off this experience with nature as impossible for other urban schools. True, the Outdoor School is atypical because of its easy accessibility to the natural environment from an urban center like Portland. However, it needs to be recognized that while the specificity of the experiences may differ from place to place, environmental science has the potential for replenishing souls. The spiritual nourishment obtained through this unique connectedness of humans with others and with nature can perhaps best be captured in Wendell Berry's words:

We go to wilderness places to be restored, to be instructed in the natural economies of fertility and healing, to admire what we cannot make. Sometimes, as we find to our surprise, we go to be chastened or corrected. (Berry, 1987, p. 17)

Rooted in the soils of Crestview breathes the gist of life vibrant in memories and sacred in essence. Cherishing and protecting our inheritance through collective experiences of vitality of life would likely provide vigor and hope for future generations.

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Notes

1. In his chapter "Wondering and the Roots of Motivation" (pp. 193-211), Green provides an important pedagogical argument for curiosity and wondering in education.

2. The history and description of the Outdoor School were obtained from handouts, handbooks, workbooks, and junior counselor training manuals provided by the Multnomah Environmental Education Program, Multnomah Education Service District.

Literary Journalism as Educational Criticism: A Discourse of Triage

Sue Books

Tracy Kidder's *Among Schoolchildren* and Samuel Freedman's *Small Victories* illustrate the educational implications of accepting the notion that the world is "rigged" and that some students are always going to be "winners" and that others are perennial "losers."

Although uncertainty about what can be known and by whom in these postmodern times colors all attempts to describe what is *really* going on, plausible interpretations are not only possible, but critical. As I see it, our public schools have been commandeered into the service of the United States' frantic pursuit of economic dominance in the world. Cries of alarm about the sorry state of American education in report after national education report have fueled the competition and selectivity that structure not only the pursuit of good grades and college degrees, but also the broader social competition for material comforts and economic security. Legitimate public fears about what life in America will be like in the coming decades have been exploited by public leaders and social commentators, who have responded to this anxiety not with demands to free the schools from the broader culture's worship of competition and hierarchy, but rather with calls for higher standards and clearer demarcations of success and failure — calls, that is, for *more* competition and hierarchy.

All this, of course, has been said many times before. Nevertheless, it generally is not part of the public discourse on education. Among the cultural realities to which critics must respond, it seems to me, is an evaporating public sphere in which who we are as a society and in relationship to one another can be examined and critiqued. As Purpel and Shapiro (in press) have argued, most of the public discourse on education written by people outside of the education profession (e.g., journalists, public officials, and scholars in other fields), trivializes the moral dimensions of schooling — or ignores them altogether. And most of the professional discourse on education written for the public (e.g., research descriptions and evaluation reports), lacks any critique of the social, cultural, and spiritual context that produces realities such as children coming to school hungry, children

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going home to no home, and high school students killing themselves in record numbers. Absent from the public discourse on education, therefore, is any contextualization of the moral issues — that is to say, any serious cultural criticism that would raise the kinds of questions which could lead to informed public debate about what the aims of education are and ought to be and about how the schools (and their critics) can and should respond to the exigencies of the broader society.

The nature of criticism, of course, reflects to some extent the situation of the critic. Jacoby (1987) traces what he sees as the near disappearance of public intellectuals, as would-be social critics have joined faculties and settled down to the business of cultivating specialties. Ehrenreich (1989) similarly chides the professional middle class for what she sees as its narrowness of concern — a moral orientation, she suggests, that reflects this class's recognition of its own relative privilege in a society in which status, at least for the professional middle class, is never assured but always contingent.

All of this may help explain why the public discourse on education is so threadbare.

A hopeful sign for me — after Bloom's (1987) unabashed (and best-selling) call for more elitism and hierarchy in *The Closing of the American Mind* — were Tracy Kidder's (1989) and Samuel Freedman's (1990) journalistic accounts of teaching in late twentieth-century America. Although Kidder's *Among Schoolchildren* and Freedman's *Small Victories* are a few years old, I believe it is important to evaluate them now for two reasons. First, in a time when not much serious educational criticism is being written for the public, these authors offer accessible, contextualized critique of the public schools. Kidder's book was on the best-seller list for months, and Freedman's (the better of the two) has been in popular bookstores. What Horton (1990) says of Kidder's book could be said of Freedman's too: "More people will form a favorable opinion and understanding of schools and teachers from this book than from reams of government and foundation reports, scholarly dissertations, and statistical treatments" (p. 83).

This, however, raises the question of *what* understanding books like these invite, not only about the world of school and about the broader social and cultural context of schooling, but also about the prac-

tice of educational criticism itself — hence, the second reason for critiquing Kidder's and Freedman's texts. As examples of educational criticism, these books raise important questions about journalism as a form of educational criticism. From a methodological perspective, it needs to be asked, what do these books suggest about the possibilities and limitations of literary journalism as a form of educational criticism?

My own methodology derives from the model that Mann (1975) has provided for the work of curriculum criticism. The critic's task, he says, is to disclose meaning by explaining design in such a way as to illuminate the influence that a curriculum would exert. This is a methodology of moral discernment in the sense that the critic's "commitment is to disclosing those meanings that impinge upon his ethical knowledge ... meanings about which he believes ethical judgments are to be made" (p. 145). I want to approach the Kidder and Freedman texts — public curriculum, as it were — in this spirit and explore

My central question, then, is not what Kidder's and Freedman's narratives tell us about teachers and schools, but rather what moral context and what social and cultural values they reflect.

what I see as the critical moral dimension of their narratives. That is, I want to do as Eagleton (1989) suggests and "listen to [this] discourse as at least in part symptomatic of the material conditions within which it goes on, rather than as a thing in itself" (pp. 35–36). I also want to attend to the literary dimensions of these journalistic accounts and so to read each as "a social semiotic, as a string of signifiers ... that reveal ourselves, that provide us with a heritage for our own times" (Aronowitz & Giroux, 1991, p. 37). My central question, then, is not what Kidder's and Freedman's narratives tell us about teachers and schools, but rather what moral context and what social and cultural values they reflect. Finally, I comment on the implications of literary journalism as a genre of educational criticism for holistic educators and educational critics.

Kidder, *Among Schoolchildren*

Tracy Kidder (1989) spent a year in and around

Chris Zajac's fifth-grade classroom at Kelly School in Holyoke, Massachusetts, then wrote about classroom life for the most part as if he were she. Implicit in his description, however, is the construction of a world — a way of thinking about social injustice, moral ideals, and human possibility — and this is what I want to explore.

Although Kidder does not rail against the plight of teachers and students (indeed, as Horton 1990, puts it, he invites "a favorable opinion" of the world of school), he does suggest that all is not well. Rich and poor, but mostly poor, attend Kelly School. Many of Chris's students are struggling to grow up under extremely oppressive conditions, which take their toll. Kidder depicts a world in which "children get dealt grossly unequal hands," then are sent to school where some are "cored" (for core evaluation) and "dumped" (p. 18):

Chris thought that the wrong children often got, as the saying went, "cored" and sent to the Resource Room, children whose main problem with school seemed to be behavior, not ability. The Resource Room teacher remarked, "It's something of a dumping ground. I hate to say it, but it is." Nevertheless a core was the only remedy for Pedro.... Chris pictured this little boy sitting quietly at his desk, day after day, year after year, learning almost nothing, not even understanding half of what was said, and never complaining. (p. 82)

While some children are simply forgotten, others are sorted into the (socially constructed) categories of winners and losers. During an emotionally wrenching science fair, Chris noted,

The children whose parents had come to the gym — for the most part neatly dressed, confident seeming adults — had the best projects and knew the most about their subjects. In general, the forlorn projects belonged to the children with no parents on hand, such as Courtney and Kimberly, who stood behind a table displaying a box of oatmeal, a hamburger bun, a piece of white bread, a carton of milk, an egg, two potatoes, and a remnant of iceberg lettuce growing brown. (pp. 279–80)

Kidder comments: "Chris wished she could call a halt right now. The whole event looked like a rigged election, distressingly predictable, as if designed to teach the children about the unfairness of life" (p. 280). When prizes are awarded, most of the children get nothing:

Chris stopped smiling when she turned her eyes toward Felipe. He was scowling. Felipe's team hadn't won anything. She glanced at the faces of Jorge, Ashley, Kimberly, Courtney. The faces of the losers looked not exactly sad but distant. As more fortunate classmates took the ribbons, many of the losers watched

with slightly opened mouths, like children gazing through the window of a toy store. (p. 285)

Again, Kidder tells us, Chris wishes it wasn't so: "If she could, Chris thought, she'd give them all prizes" (p. 285).

In these passages, Kidder points to the moral dimensions of schooling in a society that constructs children as winners and losers — many, perhaps most, of whom can be predicted at birth. Along with this portrayal of pain, Kidder offers the metaphor of a rigged world. The "hidden curriculum" of the science fair, he suggests, reflects the "hidden curriculum" of life. He wonders, for example,

How much of Julius Lester's book did the children understand? Did they know that Mrs. Zajac was reading to them about the ultimate rigged life? And that they lived in a rigged world, too, where it's still hard to overcome the accidents of birth? (p. 290)

Confronted with the injustice of a rigged world, Chris, Kidder tells us, responds with an ethic of rescue — an ethic worn down over the years, however, to the hope that she will at least not make matters worse:

She used to believe in miracles. Now she tended to believe only in mysteries. "I guess I used to feel I could really rescue kids, that if they had a good teacher, everything would be fine. It's not that I try less now. I'm just more aware of my own limitations." Forlornly, Chris said, "But I don't think I've ever taken a really good student and wrecked him." (p. 312)

In a "rigged world" in which "accidents of birth" cause suffering, Chris, Kidder says, wishes it wasn't so and consoles herself with the belief that she at least hasn't done any harm.

From the perspective of Kidder's own project, he comes to *her* rescue. She's being too hard on herself, he suggests:

She should have been more generous with herself. Teachers usually have no way of knowing that they have made a difference in a child's life, even when they have made a dramatic one.... A good teacher can give a child at least a chance to feel, "She thinks I'm worth something. Maybe I am." Good teachers put snags in the river of children passing by, and over the years, they redirect hundreds of lives. Many people find it easy to imagine unseen webs of malevolent conspiracy in the world, and they are not always wrong. But there is also an innocence that conspires to hold humanity together, and it is made of people who can never fully know the good they have done. (pp. 312–313)

Kidder depicts a rigged world in which hard-working, dedicated teachers who mean well race against the clock to rescue deserving students. But in this rigged world (in which it is taken for granted

that not everyone can be rescued), the rescuers need rescuing themselves — which seems to be Kidder's project. The dreams of educational reformers over the years have saddled teachers with an unfair burden, he suggests:

What great hopes Americans have placed in formal education. What a stirring faith in children and in the possibility and power of universal intellectual improvement. And what a burden of idealism for the little places where education is actually attempted. (pp. 299-300)

The ideals of Jefferson, Mann, Dewey, and DuBois are too grand. In our world, teachers can hope only to rescue a few, to "redirect" a few lives and not damage others too much in the process. On one level, therefore, *Among Schoolchildren* is an expression of appreciation (well deserved) for the good work of teachers like Chris. On another level, however, Kidder's book is an argument for giving teachers a break — for recognizing that they have been saddled with unreasonable expectations. Implicit in this, I suggest, is a lesson about how we might think about

with accidents exacerbated by the realities of time (p. 313). This, of course, suggests that if teachers only had more time, then they could respond more adequately to the victims "life" sends into their classrooms. Although Chris had not solved all of the "problems" she would like to have solved, Kidder concludes, "It wasn't for lack of trying"; rather, "she had run out of time" (p. 331). In a time-bound world, accidents of birth play themselves out — enough said.

But more is said here, or at least implied. Focus is important, and Kidder's is on the difficulties of teaching in a world that appears rigged, not on the metaphor itself or on the social and cultural realities that the metaphor reflects. In focusing his story this way, Kidder perhaps raises our consciousness about the difficulties of teaching, but does not call into question the whole idea that teaching is about rescuing the deserving. (From what and for what, we might wonder, are students to be rescued?) What Kidder does — and he does it very well — is to show that in a society that asks its teachers to teach children about winning and losing, the children suffer and the teachers feel trapped, forced as they are into a socially constructed role of rescuer.

What Kidder also does in depicting social injustice in such an entertaining, even uplifting, way (and this is what leaves me with such mixed feelings) is to suggest not only that this is just the way things are, but consequently that

we ought not beat ourselves over the head about it. After all, don't we, like Chris, wish it weren't so? And aren't we, like Chris, doing what we can? Kidder's book invites sympathetic identification with those who strive to do good, not outrage in the face of that which frustrates their efforts.

At one point Chris's teacher-friend calls into question the morality of the whole enterprise of public education in this society. The friend comments about one of Chris's students:

"He'll work at Ampad and be happy as a clam. (Ampad was a paper company with a factory nearby.)

"It's too bad, though," Chris replied in a low voice, "because he has potential."

"Just think," said the other teacher. "If we did our jobs the way we are supposed to, there wouldn't be anyone to do the menial jobs."

The other teacher laughed heartily, but Chris didn't seem to hear the remark. (p. 306)

This passage suggests a fairly direct connection be-

Kidder points to the moral dimensions of schooling in a society that constructs children as winners and losers — many, perhaps most, of whom can be predicted at birth.

teachers and the social injustice to which we ask them to respond — that is, that teaching too often is a thankless task that requires *understanding*, not grand visions of what might be.

Although Kidder's explicit project is descriptive, his metaphor of a rigged world, as I said, suggests a universe in which suffering and injustice elude human control. Consistent with this is Kidder's notion of "accidents of birth." "Accidents," of course, are not tragedies. Accidents are unfortunate, but not necessarily unfair; regrettable, but not necessarily outrageous.

Accidents ..., however painful or regrettable, do not connect with any general meanings. This view is made even stronger when the unavailable meanings, for a particular event, are described as universal or permanent. (Williams, 1966, p. 47)

In a universe shaped by what Kidder calls "an innocence that conspires to hold humanity together," he connects the suffering and injustice he depicts

tween the practice of schooling and the maintenance of an occupational hierarchy weighted on the low end. Here, Kidder acknowledges the horror of what Holt has described as teaching a few to get what they like and the rest to like what they get, but then lets Chris off the hook: She didn't seem to hear. (One wonders, did Kidder hear? And do we?)

In a similar fashion, Kidder describes the pain that the science fair produces, but focuses not on that but rather on Chris's emotional response. Chris, he tells us, wishes the fair *weren't* a lesson in "the unfairness

Kidder's book invites sympathetic identification with those who strive to do good, not outrage in the face of that which frustrates their efforts.

of life." She wishes having winners *didn't* require having losers, so that all the children could get prizes. Don't we all? By covering the pain with the sentiments of regret, Kidder deflects outrage and, I suggest, gives us an out. We, too, wish it weren't so. Kidder "rescues" not only Chris but also middle-class hopes in general from burdensome ideals. Like Al the principal, whose perpetual optimism seems grounded in almost nothing, Kidder celebrates good intentions in a world riddled with suffering and injustice.

Freedman, *Small Victories*

Samuel Freedman (1990), like Kidder, depicts the poignancy of teaching in a broken world by writing from the perspective of a single teacher — Jessica Siegel, an extraordinary English and journalism teacher at Seward Park in New York City. In his introductory remarks, Freedman lays out the ideological context of schooling in America: Torn apart by beliefs in democracy *and* meritocracy, we have projected this contradiction onto the schools, construed as a world apart.

Since its founding, America had been torn between its belief in the perfectibility of all citizens and its longing for a British-style elite: It wanted to be both Eton and Eden. Already saddled with those impossible and irreconcilable expectations, the public school system from the 1960s on was handed every problem being abdicated by family, church, and community. The public school was seen as a bathosphere, tethered to the ship of society but bobbing peacefully undersea,

somehow unaffected by whatever mutinies or hurricanes wracked the vessel. (p. 5)

Part of what schooling in our society does, Freedman suggests, is to help smooth over the fundamental contradictions between, on one hand, democracy and meritocracy and, on the other, meritocracy and the existing relations of power. Schools, this is to say, legitimate the punishments as well as the rewards distributed to winners and losers in a socially constructed competition.

This is exactly the function of Seward Park, where Jessica teaches — against the odds:

One-fourth of all new freshmen ... are already seventeen years old, suggesting they have been held back several times or have only recently reached America. Nearly 20 percent were absent for more than eight weeks of the preceding school year, and half of them are officially considered high risks of dropping out. Some 155 require bilingual education or courses in English as a Second Language. And all these numbers ... are

bound to increase. If recent history repeats itself, 600 more students, most of them new immigrants, will register at Seward Park during the academic year, pushing the school toward 150 percent of capacity. (p. 26)

If these kids don't "make it" — that is, pass their competency exams and get into college — who should be surprised? No one, Freedman suggests, because in an important sense the school itself was "built to fail":

The surprising irony of Seward Park and institutions like it ... is that the "neighborhood school" — once the rallying cry of a white middle class that was indignant at integration — has become the catchbasin for poor black, Hispanic, and Asian children in the late 1980s. These children are the waste products of the new improved sorting machine. The weight of history and the miracle of modern social engineering conspire for disaster, and yet when education critics, social scientists, and newspaper editors stumble upon it, they act as if they had discovered a startling scandal. But there is another way to conceive of Seward Park and its ilk. In a school built for failure, anything short of failure qualifies as a kind of success. (p. 118)

Freedman here suggests what seems to be his own project: to demystify "failure" and redefine "success." He points a finger at the hypocrisy of the education policymakers. The Reagan Commission's report of 1983, for example,

amounted to a compelling argument for increased federal funding of public schools, the sort of funding that was enacted after Sputnik. At the same time, the Reagan administration was cutting back aid to schools, reducing related programs ranging from Head Start to low-interest college loans, advocating

tuition assistance for families of private school pupils, attacking the entire concept of bilingual education, and attempting to jettison the U.S. Department of Education itself. (p. 4)

Freedman also chides head-in-the-sand education critics who perpetuate the myth that schools exist somehow apart from society.

Implicit in the expository project, however, is, again, the construction of a world. In a school "built for failure" but expected to strive for "success" — that is, to structure the competition among students but also to participate in a competition among schools — the *teachers* must respond to this painful contradiction. Freedman depicts a variety of responses, which I would characterize this way:

1. Acquiescence. This describes the "clock punchers," who respond to the challenge of teaching in an unjust world with apathy and resignation. Freedman comments:

Some of the clock-punchers must have begun with admirable intentions; they must have enjoyed the camaraderie and occasionally even the kids. But they would not sacrifice their personal time to the cause; rather than quit, rather than surrender the health insurance and free summers, they chose to cut corners, to scale back from full essays to one-paragraph answers to mere phrases to multiple-choice circles and true-false slashes — to replace, in essence, the scribbles and cross-outs of endeavor with the Liquid Paper of image. (p. 227)

2. Condemnation. This is the response of Bruce, the radical drama teacher whose students stage a play critical of their own schooling. As Freedman puts it, "This is an evening for reversing roles. The graders are being graded, and the report card shows straight Fs." Bruce tells his colleagues:

If you know kids at Seward ... you know they're very smart, very bright. But in Seward, every student is told, "Take off your coat," "Don't wear a hat," "You can't go to the bathroom now." As if these kids don't know when they want to take a piss." His students hoot, whistle, shout him on. "What we need is to turn the school on its head." (p. 262)

Unlike Jessica who "busied herself with the classrooms at hand," Bruce "assailed 'The System,' outside Seward Park and within" (p. 216).

3. Triage. This term for the practice of separating war wounded (into those likely to live regardless, those unlikely to live regardless, and those who might live with help but not without it) describes the ethic practiced by Jessica and the guidance counselor, Hal Pockriss, her "partner in salvage and reclamation." Freedman comments:

Analysts pronounced themselves baffled at the con-

traditions in a school system that produced one-third of the nation's semifinalists in the Westinghouse Talent Search and simultaneously lost 80 percent of the pupils in some high schools before graduation. Any battlefield medic knew the answer was simple: Triage. Triage is the process — and the principle — of separating the casualties and concentrating efforts on those who are most likely to survive. (p. 114)

As Freedman says of Jessica's orientation as a journalism teacher, it is important to illuminate "the human choices hidden inside the practical craft." Jessica is the heroine of *Small Victories*, not the clock watchers and not Bruce — though Freedman seems conflicted about him. Freedman comments that Bruce's students seem to parrot his radicalism, but also notes that although Jessica finally quits, Bruce stays on and runs for chair of his United Federation of Teachers chapter. Jessica, he says, notes the irony: "Here is Bruce, backing up all his big talk, not only staying at Seward Park but trying in a direct way to improve things. Here is she, quitting" (p. 384).

In this sense, Jessica herself is one of "the waste products of the new improved sorting machine" (p. 118). Drained and frustrated, she leaves the teaching profession to try to put back together some semblance of a life for herself. Freedman comments:

A good teacher doesn't fall out of bed one morning as a burned-out case. A good teacher is ground down to mediocrity over weeks and months and years, and a good teacher who tries to resist learns that the millstone is an implacable adversary. (p. 213)

The world Freedman depicts is, on one hand, just this: "an implacable adversary" — too much poverty and violence that won't "stay in their places" outside the school walls. On the other hand, the world of *Small Victories* is one in which Jessica and all she stands for shine brightly:

Each year at college-application time, Jessica becomes Seward Park's Saint Jude, its patron of lost causes.... "Soupin' 'em up," is the Seward Park slang, and Jessica soups up so well because she believes so totally in her students and in the necessity of their higher education. (p. 337)

This is a celebration of the energy and resolve of teachers determined to push and pull nearly "impossible cases" into college and the life options a degree supposedly offers. This also, however, speaks to the pain, deep and wide, coursing through this society. Consider, for example, Hal's description of his own political morality:

From his first experiences as a guidance counselor at Haaren High School in Hell's Kitchen ... [Hal] had delighted in championing the purported losers. "You relive your life through these kids," he says. "Getting

kids with sixty-nines and seventies into college is like a displacement of anger for me. It's like fucking the establishment, all the know-it-alls. It's the feeling of power, of ego, to see kids everyone else gave up on doing so well." (p. 338)

Thumbing one's nose at the establishment is not the same thing as changing it. Snatching a few kids from the pool of the damned and hurling them into the winners' circle certainly helps those kids. It also, I suggest, relieves the consciences of so many of us who, like Jessica, yearn to be part of something good and to use our talents and energies constructively, and who also, like Hal, yearn for redemption in a racist, sexist, class-stratified world in which who we are is always inadequate.

Freedman recognizes the tension between a perception of "lost causes" and a determination to back them anyway, and he responds to that tension by focusing on those who "psych themselves up" and manage somehow to repress the pain. As Dave Patterson, the truant officer, puts it: "You got to psych yourself up.... If not, you fall apart. There's so much bad to look at. You *have* to look for the good.... Because I don't need to be put down. I been put down all my life. Comin' up black" (p. 161). Freedman depicts this struggle, which, I suggest, is the middle-class struggle to psych ourselves up because the pain and suffering of our world, much of it humanly constructed, is so hard to live with and in. In this way the struggle for *justice* all too easily is siphoned off into an individual search for personal *justification*. The confusing of the two, however, gives injustice a free reign. In a world built around winners and losers, championing the "losers" is important and necessary work — work, however, that ought not be confused with the also important and necessary work of calling into question the moral foundations of a society that forces its young to compete to not be given up on.

Small Victories concludes with correspondence between Jessica and a much-loved teacher of her own. The former teacher writes back: "I hope someday you get a letter from a student like the one you sent me. It will bring tears to your eyes and gladden your heart" (p. 420). No doubt it will, but emphasizing this amounts to changing the subject — from the injustice of a world that sorts and selects among its young to the emotional power of the teacher-student relationship in such a context.

Kidder and Freedman both acknowledge the so-

cial and cultural context of schooling. It is clear that many of Chris's and Jessica's students suffer because of who they are in a society that does not value all of its children. Kidder's and Freedman's focus, however, is not on this but rather on the poignancy of the teacher-student relationship in such a context. Therefore, while in one sense Kidder's and Freedman's accounts are about the need to give teachers a break in a broken world they themselves cannot possibly fix, in a broader sense their narratives speak to the acceptability of giving all of ourselves a break in a world so broken as to appear beyond repair. The challenge becomes withstanding the pain.

Among Schoolchildren and *Small Victories* invite what Horton (1990) calls a "favorable opinion," not only about the world of school. In the process, they also invite at least an attitude of tolerance toward our (inadequate) collective response to social injustice — a job we "delegate" to teachers by construing schools as somehow a world apart. Horton notes, insightfully, that Chris clearly is not meeting the needs of her students (p. 83). Of course she isn't, but the problem isn't Chris; it's the terrible injustice to which her students bear witness. Neither, of course, is the problem writers like Kidder and Freedman — although as educational critics we might ask them to do *more* than describe injustices they neither adequately explain nor condemn.

Among Schoolchildren and *Small Victories* reify so-

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cial evil and depict moral orientations that amount to accepting — even rejoicing in — the "small victories" possible in the taken-for-granted "rigged world" or allowed by the omnipresent "sorting machine." If the world is always already rigged (and so not our fault) and the sorting machine runs no matter what, then the most we can hope for is occasionally to "beat the system" without fundamentally changing it. In this sense Kidder and Freedman affirm the

human capacity to care, but in the absence of any real hope that we can create a world worth caring about. In so doing they invite us to respond to the emotional power of the interpersonal in the face of our seemingly overwhelming social problems and the cultural values that exacerbate them.

Toward a healing criticism

Kidder's and Freedman's accounts are important in several ways. First, they show us the human face of suffering refracted through the institution of public education: Children hurt in a world that con-

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structs them as winners and losers. Kidder and Freedman also show us the emotional toll this ideology takes on teachers, cast in the role of rescuer. Most important, however, I think, is the lesson these books teach the rest of us — which is, I suggest, that we ought not to dwell on the bad, on the suffering and injustice, but rather to appreciate the caring and warm-heartedness that survives nonetheless.

From this perspective we can raise questions about how the educational criticism that Kidder and Freedman practice — literary journalism — functions in the culture. The narrative form these gifted writers use enables them to capture — far better than technical reports, truncated journalistic accounts, or scholarly articles could — the nuances and moral and emotional complexities of teaching in an unjust world. At the same time, these literary accounts, however journalistic (ostensibly objective), are not morally, which is to say politically, innocent.

As a former reporter myself, I know well the *selectivity* that shapes all "reports." Reporters, of course, always report what they want to report — for any variety of reasons, including deep-seated commitments to a professional ethic that requires at least an effort toward objectivity. Nevertheless, political biases can never be factored out. Neither can the "ear" one develops for "good quotes." I make these remarks not as criticisms, but rather as observations: There is no such thing as either objective or com-

prehensive journalism, and moral and political commitments as well as what might be called aesthetic considerations always figure into the paring down process such writing reflects. In painting one picture, Kidder and Freedman do not paint another. In inviting particular responses to their portrayals of classroom life, they discourage others. As always, however, the "null curriculum" — that is, what is not taught or presented — matters.

As journalists, Kidder and Freedman do a very good job of describing, from the outside, the stresses and strains of teaching in an unjust world. As educational critics, however, we might ask them to *ask better questions*. In inviting us to associate with the plights of teachers like Chris and Jessica, Kidder and Freedman do not ask us to focus on what created their plights to start with. Kidder and Freedman play with the powerful metaphor of triage (although only Freedman makes it explicit) but do not ask the critical question: How did we get to the point of believing that some children have to be given up on? What values are implicit in such an assumption? What constructions of students, teachers, and public schooling?

The social and cultural criticism to which these questions point is beyond the scope of this article. However, the straightforward argument that McClure (1983) makes for what amounts to triage as an imminently sensible educational policy is suggestive, particularly with respect to constructions implicit in a discourse of triage and rescue in a rigged world. We need, McClure argues, to admit what to him is the obvious and incorporate into the discourse on education the concept of "*enfants perdus*" (literally, lost children):

The concept of the *enfants perdus* is a way of thinking about people and categorizing the essence of their condition. In this instance, we may speak of a body of troops which may be considered analogous to a group of students. Any unit of soldiers may be categorized, initially, as an asset to the commander, the army, the task at hand, and the society which depends upon them.... In the course of events in a military engagement, however, some portion of these troops may become isolated, and their situation may become precarious. In fact, their situation may become quite hopeless.... In essence, they change in a moment from an asset to a liability. They become *enfants perdus*....

The appropriate decision — the only appropriate decision — once these troops have been defined as *enfants perdus* is to write them off and consider them lost. (p. 39)

In constructing/portraying teachers as rescuers, Kidder and Freedman show us how difficult teaching can be. What they do not do, however, to use McClure's frightening analogy, is to raise questions about the social, cultural, economic, and political origins of the "war" itself or about the notion that students are potential "assets" or "liabilities" to the larger society — one moment, someone "we" would like to have around; the next, a drain and a burden.

If journalism is finally an inadequate model of educational criticism, so too, it seems, is literature, at least in the sense that Eagleton (1985/1986) understands this particular form of discourse — that is, as a kind of "moral technology ... a particular set of techniques and practices for the instilling of specific kinds of value, discipline, behavior, and response in human subjects" (pp. 96–97). I want to comment next, therefore, on the *literary* dimensions of Kidder's and Freedman's literary journalism, which, like liter-

pregnant contradictions that point toward the need for serious cultural critique. Kidder depicts the pain that standardized tests create for teachers and students alike at Kelly School. The students do poorly, which demoralizes the teachers. When the results of a statewide test are printed in the local newspaper, Chris takes it hard:

Everyone had read the article. On the Basic Skills Tests, Holyoke schoolchildren had some of the worst overall scores in the state.... She fretted about the Basic Skills Test. Several of the students from her low math group of last year had flunked. What had she done wrong? (pp. 200–201)

Contrary to what Kidder suggests, Chris seems burdened not by ideals, but rather by the humanly constructed competition in which she is forced to enlist her students — and so herself. Would it really make a difference if some other school had been so "unlucky" as to have the near-bottom scores? Is the possibility of redistributing the pain of losing the most we can hope for?

After the awful science fair, the school year ends with field day. Chris's class loses in several events, so she gives a pep talk: "Come on, we've got to win *something*" (p. 314). At last they do — the tug of war: "The front chalkboard, after lunch, recorded the triumph in excellent spelling: VICTORY AT LAST ... TUG OF WAR CHAMPIONS ... WE ARE THE BEST ... WE CAN PULL!" (p. 315). Of course, we all know that ability to pull counts far less in this society than ability to score highly on standardized tests,

Most important ... I think, is the lesson these books teach the rest of us — which is, I suggest, that we ought not dwell on the bad on the suffering and injustice, but rather, appreciate the caring and warm-heartedness that survives nonetheless.

ature in general, Eagleton says, produces "a historically peculiar form of human subject who is sensitive, receptive, imaginative and so on ... *about nothing in particular*" (p. 98). Consequently,

What is important, in this ideology of Literature, is not so much the object being grasped, which can be any kind of object you like, but the lived experience of grasping it, on the part of a peculiar individual. What is important is just the production of a specific form of subjectivity, about which we can say, quite intransitively, that it is sensitive, creative, imaginative and so on. (p. 99)

Kidder's and Freedman's texts function much this way. They produce and celebrate a self-contained sensitivity that feeds on, rather than condemns, social injustice.

In fairness, however, this is not all they do. Kidder's and Freedman's books, despite the depoliticized emotionality they invite, nevertheless reflect

but at least those children can do something well. Purpel (1989) discusses the cultural and moral dimensions of such a sentiment:

This standard [doing *something* well] indicates that a necessary if not sufficient condition for fulfillment and strong self-image is achievement and the ability to excel in a particular realm of achievement. This would indicate an ethic of conditioned love: we will love you if you achieve. Presumably the more enlightened of us have a longer list of the significant areas of achievement, but we still must achieve. Moreover, our worth is really not inherent, not sovereign, not inevitable, but continuously subject to trial, examination, and evolution. (p. 36)

The futile effort to ease the pain by redefining "achievement" reflects a contradiction endemic to the culture between a desire to affirm the dignity of all *and* an ethic of deserving that hangs dignity on individual success and achievement. Torn apart by this fundamental contradiction, we grasp at straws:

Can't we all be winners — just some more so than others? When we cling to the hope that somehow everyone can "succeed" in a world in which success has no meaning apart from failure, we are making a last-ditch effort to rescue *ourselves* from the pain of acknowledging the rottenness of a society that sacrifices its young to an ideology that legitimates winners by creating losers. Kidder shows us what this sacrificial ideology looks like inside the classroom. What he doesn't do — what the pseudo-objective stance he adopts prevents him from doing — is to provide insight into the conflict that the ideology hides.

Freedman's narrative similarly reflects cultural contradictions. Freedman shows up the school-society nexus for what, in part, it is — a sorting machine — while focusing on the energy, imagination, caring, and commitment of a teacher who responds to it all with an ethic of triage. Jessica, Freedman says, left her work as a reporter for a leftist newspaper to escape the sense of isolation it brought:

The cellar on Claremont had become a metaphor for isolation — the isolation of leftists in a nation of centrists, the isolation of watchers in a land of doers. She wanted to test her own ideals by rubbing them against their antagonists. She wanted to share the work of society, rather than review its progress like a Saturday matinee. (p. 82)

This is more than a description of Jessica's personal aspirations. It is also a testament to the middle-class longing to be a part, to do good, to contribute to something worthwhile and so to *feel* worthwhile, in a world in which dignity and self-worth are always contingent, always problematic. Freedman's response to this is to champion those who "share the work of society," even as he shows up this work for what, in part, it is: a relentless sorting of human beings — as Jessica puts it, "playing God" (p. 265).

We cheer for the students whom Jessica, against the odds, somehow gets into college through the Educational Opportunity Program. But who didn't get in because these three did? Like Kidder, Freedman doesn't raise this point because he doesn't call into question either the cultural values and structures that take for granted the inevitability of competition and hierarchy, or the notion that schools should be structured around these values. Consequently, *Small Victories* reflects a search for meaning in an unjust world, but in the absence of a vision of a better world — a world in which people are not

sorted, where children do not have to compete to be rescued, where teachers are not enlisted in the task of choosing among the damned.

An adequate practice of educational/cultural criticism, I believe, has to begin here — with the recognition that we all are implicated in a society that breeds suffering and injustice. This is a call not for yet more distanced analysis or observation, but rather for collective grief and a critical practice that gives voice to the pain it shares and seeks to understand and so to heal. To flee the pain is to take refuge in either sentimentality or cynicism, and so to deny hope. Before healing can happen, the bandages have to come off.

Kidder's and Freedman's engaging accounts of the professional lives of such kind, caring, competent, and energetic teachers as Chris Zajac and Jessica Siegel suggest that the social and cultural problems of our time require that holistic educators and educational critics do more than respond to the day-to-day difficulties of teaching in an unjust world. What is perhaps required is not only the very admirable and

How did we get to the point of believing that some children have to be given up on?

very difficult work of responding directly and personally to the victims of the injustice, but also the equally important work of educating the public about the moral and spiritual as well as political and economic dimensions of the dominant conceptions of education.

However, as Brueggemann (1987) has said, although "social criticism and exposure of the dominant ideology are important, they ... only give insight, and insight never liberated anyone. They do not give power or authority to make a move of withdrawal or delegitimation" (p. 16). Because I believe that our grave social and cultural problems are anchored in a consciousness of competition and hierarchy (and the lesson it teaches about the inevitability of winners and losers), I believe that the suffering and injustice we witness daily, in and outside the classroom, cannot be significantly ameliorated in the absence of a change in consciousness — *metanoia*, or turning toward another way of being — which requires turning *away* from the dominant values and

habits of thought in which and against which we all must struggle.

Therefore, I see the third and perhaps most difficult dimension of our responsibility as educators (in dialogue with the public as well as with our students) as articulating a social vision grounded in a thorough assessment of the breadth and depth of our social problems, as well as in avowal of our own moral sensibilities and spiritual commitments. As West (1991) says of all those committed to the work of creating a better world, educators too must engage in

a wholesale critical inventory of ourselves and our communities of struggle. More pointedly, the existential and ethical dimensions of our lives require serious scrutiny. Why do we still fight and hope for social change? What really sustains our faith in struggle and our hope for change in these barbaric times? How do we analyze and account for the egalitarian values and democratic sensibilities we act upon? (p. xiii).

As important as it is to grasp the nature and the complexity of the suffering and injustice that pervade our society — a task toward which Kidder and Freedman make a helpful and significant contribution — we also must remember what it is we are struggling for and why the struggle continues, against the odds and despite the cost.

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Endnote

1. I thank Fritz Mengert for formulating this question.

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Creating Value in the Hoikuen

Hope C. Bliss

The happiness of creating value for oneself and others is the fundamental purpose of life and the ultimate goal of education. The hoikuen is an intimate, practical, and holistic approach to supporting and supplementing families in this noble endeavor.

It sometimes seems that no matter how much we philosophize, schools remain the same or worse. After teaching students and teachers in both private and public sectors, my compelling interest has been to establish an experimental school that applies the ideas and ideals of reform with children in the process of learning within the realities of the marketplace. As such this one school could provide a workable model for other educators seeking true reform.

I believe that value-creating education starts at birth, with the preschool building upon any foundation established by the family. Serving children aged two to seven, the school offers instruction in motor development, sensory development, literacy and literature, foreign language, mathematical concepts, science, culture or human studies, art, music, social competence, creativity, and value-creation. Indeed, our curriculum guide includes ideas for incorporating discussions of aesthetic, economic, and moral value within the context of any given thematic unit.

I have had no grants of any kind nor the benefits of a university affiliation, but have steadily invested personal funds over a five-year period to create a classroom in my home with top-quality, affordable learning materials. Our educational program is approved as a preschool by the state, although we are licensed as a family daycare facility for up to eight children, in order to avoid the zoning bureaucracy and the complications of a state department for childhood programs undergoing reorganization, and to take advantage of a state-mandated liability insurance coverage for family daycare.

The Hope Nursery School is a breed of hoikuen, popular in Japan, where groups of up to eight children meet in the director's home. Parents know who will be teaching their child, because when they choose the school, they choose the director as principal teacher and policy maker. Mixed age groupings provide a family atmosphere, and opportunities for older children to teach younger children, as was so valued by Maria Montessori. Tuition is reasonable because there are no building costs beyond one's own home and no administrators to support. Mate-

Hope C. Bliss has taught preschool through postgraduate in public and private sectors and trained teachers at the University of Pennsylvania before launching her own school. She grew up in a "prototype hoikuen," as one of seven children whose grandmother taught in a one-room schoolhouse in the early 1900s. Dr. Bliss discovered that she had created a hoikuen when her visiting Japanese student teacher identified it as one. She makes her home in Annapolis, Maryland, with her husband and two children aged four and seven. This paper was assimilated from speeches sponsored by the Soka Gakkai International in November 1991 at the University of Pennsylvania and at symposia in Camden, New Jersey, to encourage dialogue among philosophers, educators, parents, and the general public.

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rials are often exceptional because they are custom selected and are a budgetary priority.

The Hope Nursery School opened in Annapolis, Maryland, in early 1990 as an operation of the Institute for Value-Creating Education, incorporated in 1985. The expressed purpose for which the institute was founded was (1) to establish a training facility to foster excellent teachers capable of implementing studies in value-creating education, (2) to found a school for children representing a diversity of socio-economic backgrounds as a laboratory of value-creating education for observation and testing of ideas, and (3) to set up a research facility and disseminate its findings in furtherance of the above goals. We hosted a kindergarten teacher from Japan last year as our very successful first teacher-training effort. Disseminating our findings through symposia and publications is part of our third goal. But primarily we focus on our second goal — the school for children.

The looming question has been: How does one apply principles of humanism and value-creation to the classroom? We will look at three areas: first, the overt curriculum; second, the hidden curriculum; and third, extracurricular techniques.

The overt curriculum. The ultimate purpose of human life is to become happy in both personal and socially responsible ways according to Japanese educational philosopher, Tsunesaburo Makiguchi (1989). He identified value-creation as the means for achieving this happiness, and clarified three types of value: (1) economic value or private gain, (2) moral value or public gain, and (3) aesthetic value relating to the senses. He wrote, "To guide students in how to live their lives in harmony with the natural world and the human world is to guide them in creating value in these many areas" (pp. 75, 189, 194). We attempt to follow Makiguchi's curricular framework in our selection of subject areas: (1) large motor, manual, and sensorial competencies, practical life skills, science, and mathematics to enhance the creation of benefit values; (2) social studies and culture to enhance moral values; (3) art, music, and literature to enhance aesthetic values; and (4) reading and language to enhance general guidance in value creation. However, considerable interpretation was required to apply these general guidelines to our particular program. For our preschool the following specific approaches were useful:

We often combine Makiguchi's three areas of value-creation within a subject area, such as science. Within a given theme — trees, for example — we examine economic or personal value, such as, "How can fallen leaves benefit us?"; moral or social value, as how our planting a tiny tree benefits the community; and aesthetic value, as how the beauty of the fall foliage inspires us in aesthetics and ecology. As we walk through the woods, we sometimes gather "treasures" such as leaves or seed travelers, and at other times we gather trash. When our recycling barrel is full, we take a class trip to the recycling center. We also visited a neighbor who sheltered injured birds for the state department of wildlife, watched and fed the birds, and became acquainted with a woman who acts on her values in caring for wildlife. We then wrote thank-you notes and hand delivered them to enhance our own value-creation.

The class works as a social unit and incorporates

The looming question has been: How does one apply principles of humanism and value-creation to the classroom?

value-creation and social competence when we do our daily chores: cleaning the classroom and kitchen after our daily snack. Jobs are posted daily, and beginning readers help nonreaders find their name and assignment. Generally we integrate more than Makiguchi's delineations would seem to indicate.

We use much of the Montessori equipment. Philosophically, Montessori is close to Makiguchi in many ways, both general and specific. Her approach encourages the inner directedness and dignity of the child interacting with the environment in a way that I think Makiguchi would have wholeheartedly approved.

In reading, we incorporate Morton Botel's (1977) "Four Critical Experiences" within a literate environment as conceptualized by Lynne Putnam (1987). This includes (1) listening and responding to quality children's literature read aloud, such as dramatizing "The Three Bears," in which children experience "book language" and the feelings of the characters; (2) pretend reading, as when children self-select books and actually reproduce patterns of book-wise behaviors; (3) composing stories, thank-you notes,

labeling leaf rubbings from our nature walks, making cards for holidays, and so on; and (4) investigating language patterns through initial consonant cards, sandpaper letters, matching simple words to objects, using the Montessori moveable alphabet, and other manipulatives. One week we had a visit from Mother Goose and dramatized nursery rhymes. This inspired lots of related reading, writing, and language pattern activity. Without focusing on value-creation specifically, this approach develops a positive emotional connection with reading and our literary heritage, as well as focuses on the behaviors and feelings of the characters in value-creating way.

In music we use a Zoltan Kodály-inspired approach, based on folksongs indigenous to cultures represented in America. Music literacy enhances reading, and singing games enhance the children's experiences of different subcultures and of themselves as a group. With Kodály's emphasis on voice, every healthy child has access to making music and every school can afford a music program.

Within our overt curriculum, we try to follow guidelines for education by a contemporary interpreter of Makiguchi's philosophy, Daisaku Ikeda, by focusing on internationalism, integration, and creativity. Internationalism is evident in our focus on geography using Montessori puzzle maps and flags; the study of foreign language; folksongs in music; and the focus on various cultures: African, Japanese, and French in particular this year. We teach Japanese as our foreign language, taking advantage of our visiting Japanese teacher and my own interest, as well as to avoid complicating local school programs in French and Spanish, which begin in the first grade. We hold an independent Japanese class once weekly, which is very popular and overenrolled, including conversation, reading and writing hiragana, games, dressing in kimonos and sandals, watching Japanese children's television, and weekly snacks. The children have become very adept at making simple vegetable sushi. Twice we have gone to a local Japanese restaurant with all of the families for an authentic dinner on floor pillows with chopsticks and grills to taste Japanese culture firsthand.

Integration is evident in our thematic approach, where topics of interest to the children are centered, as in the British infant schools, and then explored

through the various disciplines as appropriate. Taking our scope and sequence in mathematics, for example, we try to relate suitable number and conceptual skills to our study of trees, as in measuring their circumference and seeing patterns in their leaves. Another thematic example in which we integrate our knowledge is our study of homes and shelters. We build some shelters using large blocks inside, build others in the sand or snow, and find animal shelters in the woods. We practice using real hammers and saws and hand drills for manual competence; measure our shelters and map them together; discuss forms of energy used in our homes; identify forms of shelters used in different environments by primitive



Figure 1. A child-sized homey environment with windows out to the garden. Closet is filled with stereo and video equipment.

peoples from Townley's (1978) art curriculum, entitled *Another Look*, sort puzzle pieces of various architectural styles that require careful discrimination of detail; sing the Afro-American song "Old House"; and discuss personal, social, and aesthetic values as we create a neighborhood of paper houses.

Creativity is woven into activities throughout the curriculum, but is expressly mentioned under each thematic unit to ensure its conscious inclusion in our daily work. We include under creativity not only original work in the arts, but also problem-solving in all of the disciplines, which is so vital for the future. For example, as we study homes and shelters, children may build a shelter of their own design for the classroom guinea pig with long tunnels or for themselves using large cardboard blocks. They can paint,

or draw, or create a design on the computer, or glue a collage of household items. They can write or dictate a related story. Creativity usually comes after information gathering: They observe animal and primitive shelters first, compare different Victorian houses, read related books — fiction and nonfiction; then they assimilate these ideas and hopefully create new ones in their own work. Popular books for this unit include *The Little House* by Burton (1942), the apartment-dwelling *Eloise* by Kay Thompson (1955), *Building a House* by Barton (1981), and *Home Sweet Home* by Roffey (1982) about animal shelters.

The hidden curriculum. The hidden curriculum consists, by definition, of the unspoken but powerful messages we send to children about what is valued by (1) the time and space we devote to various activities, (2) the gestures and attitudes conveyed by the teacher, and (3) the type of learning materials utilized.

The most radical of Makiguchi's proposals back in the 1920s was the half-day school, reaffirming the value of work in the community to a child's education. His proposal was echoed by John Gatto, New York State Teacher of the Year for 1990, in his acceptance speech: "Independent study, community service, adventures in experience, large doses of privacy and solitude, a thousand different apprenticeships — these are all powerful, cheap, and effective ways to start a real reform of schooling." (Gatto, 1990, p. 100) As a preschool, we are not expected to offer more than a half-day program. As a childcare facility, we get many calls from parents seeking full-day care. The hidden curriculum of two-and-a-half hours a day three days a week says we are interested in children being raised primarily by their parents rather than all day daycare. We value the child's exposure to errands around the community, meeting a variety of shopkeepers and acquaintances of their parents, seeing the society at work, and interacting with it. At the same time by providing a second home of sorts for the child, we hope to de-intensify the nuclear parent-child relationship in today's small family, so that children are not socialized exclusively by their parents. Alexander (1977) noted the importance of this in his book on social architecture, *A Pattern Language*, and cited the advantages of a shopfront school for the slightly older child, aged six or seven, as a place where children can have a daily

interaction with the community at large. I hope to open classes in such a location in the future as our school and our students grow.

A discussion of time allotment includes what is taught first in the day, what is focused on in group discussions, what is taught most often and what is taught for the longest time. This is somewhat difficult to ascertain in a class where literacy is integrated in the study of art, and math is integrated with science and cooking and counting in Japanese. The fact

We study Pieter Bruegel in the fall as we listen to Antonio Vivaldi's Four Seasons, walk through the fall foliage in the woods behind the school, and learn how red and yellow paint mix to make orange on our art easel.

that everything is approached with an element of enthusiasm, discovery, and integration is testament to a Renaissance approach where learning in all the disciplines in a socially interactive way is vital.

The social and psychological aspects of the design and use of space was discussed by social architects Robert Sommer (1969) and Edward Hall (1966). Both described how buildings and room design affect human behavior. The typical rectangular classroom with chairs in rows and wide windows accommodated the need for light, ventilation, ease of surveillance, quick departure, and a factory-like atmosphere as existed in the early 1900s. Montessori likened children in these schools to "butterflies mounted on pins, fastened each to his desk" (Sommer, p. 99). If we are to restore humanism to education, it must include humanistic environments. Our own classroom is a 22-foot-square carpeted family room with windows and a door to the outside with 40-foot-candle lighting throughout. We use the kitchen for cooking and snacks and the living room for music and computer. It is a home. It is not an institution, nor does it feel like one. The family room is very human and furnished for children, except for an adult-sized couch where we read stories in school and commune as a family in the evenings. The concept of space in homes for tiny students and shop front space for slightly older children says a lot about the value of home and community to the education

of our children. These ideas are not new, but they seem to have been forgotten in our country in recent years.

Teachers convey values through their gestures and attitudes. Their handling of classroom pets and books and children says a lot about their attitudes. Makiguchi (1989), Montessori (Standing, 1957), and John Dewey (1944) all wrote about how a teacher can be a resource, directing when needed, but primarily leading a child to discovery, contrasting with the Puritanical school marm in front of forward-facing desks in rows where children are expected to conform, memorize, and be quiet except to recite or answer questions. The hidden curriculum in the role

The school is a catalyst for learning in the family — giving ideas, strategies, and inspiration to parents who in reality will always be their children's primary educators in life.

of teacher-as-director values and encourages the child's independence, interests, and direct experience in learning, while at the same time models patience, respect, and nonjudgmental support. Wrote Makiguchi, "A teacher ... needs the sensitivity of a midwife to aid in the self-actualizing process without trying to control it, to be ready and standing by, but not standing in the way" (Makiguchi, 1991, p. 6).

Finally, the type of learning materials teaches values. Our materials include much of the Montessori equipment, objects from nature, selected art supplies, prints from the National Gallery of Art and from the "Mommy, It's a Renoir" program, selected children's literature, musical instruments from folk cultures around the world, working tools, the Peabody Picture Collection, math manipulatives, educational videotapes, Kodály-inspired music literacy materials, audiotapes of art and folk music, two computers, and extensive innovative learning games. Available on a regular basis are blocks, modeling clay, Montessori sensorial and manual development equipment, an art easel, a child-sized housekeeping center where we cook our own class snacks, abundant library books, and large motor apparatus. Materials that are appealing to children, durable, ma-

nipulative, aesthetic, and invite creativity and discovery are predominant.

During class time we play the music of one composer for several weeks as the children do their work. When we take attendance, that composer is included in our attendance cards, along with our artists-in-residence for that month (whose works are displayed), and other appropriate historical figures, such as George Washington, Martin Luther King, or Christopher Columbus. The children learn to value them as important people and become familiar with their work. Being exposed at such a young age creates an emotional bond, I believe, and ensures a lifetime interest in the arts and history. We are also able to integrate the study of the arts with thematic units. For example, we study Pieter Bruegel in the fall as we listen to Antonio Vivaldi's *Four Seasons*, walk through the fall foliage in the woods behind the school, and learn how red and yellow paint mix to make orange on our art easel. Children respond naturally to art, as they are more in tune with their own artistic spirit than most adults are.

Our parents take their kids to many good local productions, such as *The Nutcracker*, *The Mikado*, the symphony for children, children's theater and Les Ballets Africains on tour from Guinea at the Naval Academy. We also have a rich collection of videos, showing Barishnokov in *The Nutcracker*, Japanese calligraphy, origami, taiko drumming, dancing, and culinary art, and *Life on Earth* (illustrating the flight patterns of insects and evolutionary development in nature), to name a few. We show selected short sections to illustrate a given theme and help the children use television in an educative and critical way, rather than as simple passive entertainment.

Extracurricular techniques. Extracurricular techniques are those activities outside the expressed subject matter being studied, but integral to the value created by a student toward that subject matter. Louis Rath (1966) described these techniques in his book, *Values and Teaching*. His basic strategy is a prescribed method of responding to what a student says or does to help him clarify his own feelings, thinking, alternatives, choices, and, indeed, values. Crucial to the technique is the adult's noncommittal and accepting attitude in making these responses, which include the following:

Is this something that you prize?
 Are you glad about that?
 How did you feel when that happened?
 Did you consider any alternatives?
 Was that something you yourself selected or chose?
 Would you like to tell others about your idea?
 Would you do the same thing over again?

(Raths, 1966, pp. 56-62)

Raths's technique is applicable to any age. We use questions from his work appropriate to our young students, hoping to help them form their own values from off-the-cuff statements they make during the day.

I do not pretend to be the first nor the foremost person to introduce these children to humanism and value-creation. It started at birth in their own homes, experiencing their parents' personalities, interactions, and environment. Home is where values originate; school either reinforces or confuses those original values. I hope that our school is a catalyst for helping our parents to become aware of their own values. We discuss this directly at biannual parent conferences, during informal conversations as the parents pick up their children at school, and in our biweekly newsletters.

Our one hoikuen or small neighborhood school answers a real need in our community. This type of small, neighborhood school is attractive to parents and kids, as well as lucrative to creative educators who are tired of public school bureaucracy and endless related pedagogical guidelines. Even with just eight students, tuition waivers can be offered next fall to insure socioeconomic diversity. Although the state must certify the learning program and its general goals, there is considerable freedom within the hoikuen to pursue one's own ideas about successful pedagogy. Most important, it is close to family.

The Hope Nursery School is also a part-time resource and support center that provides a time for parents to reflect and regroup from their ever-important, ever-consuming task. And it provides a social learning time for youngsters that can spark interests and support what is learned at home and in society at large. It is for parents of any background who are able to spend time with their children and who take a personal interest in their learning. The school is a catalyst for learning in the family — giving ideas, strategies, and inspiration to parents who in reality will always be their children's primary educators in life. In a time when schools are expected to do the impossible, the hoikuen concept can reinforce the idea that ultimately parents and kids are

responsible for their own education, which benefits both them and society.

When parents take responsibility and make education their personal priority, not only the kids thrive, but also the parents, who themselves rediscover the thrill of teaching and, indeed, learning. An educative resource center, like the hoikuen, can be the impetus and the encouragement. In a time when public schools are struggling for credibility and private school tuitions are skyrocketing, this emphasis on learning early and informally at home — with help at someone else's home — may be one important answer that will expand in years to come.

Nonetheless, it remains only one interpretation of value creation. Not every neighborhood nor every teacher is likely to open a new hoikuen in the next decade. The basic philosophy of and strategies for creating value start at home in the family and can be applied in small or large public or private schools serving all ages through the overt curriculum, the hidden curriculum, and extracurricular responses. Value creation is the key in consciously affirming the crying need for character development and ultimately greater happiness in life to develop *capable* human beings in the best sense of the word.

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Book Reviews

Mind and Matter: Imaginative Participation in Science

by Stephen Edelglass, Georg Maier, Hans Gebert, and John Davy

Published by Lindisfarne Press (RR4 Box 94 A-1, Hudson, NY 12534), 1991. 136 pages, \$12.95, paperback.

Reviewed by R. H. Brady

From the first comparison — between the everyday perception of a human smile and the “scientific description” of the same — the authors of this small, remarkable volume work out a critique of the notion of *objectivity*, which is ubiquitous in all modern scientific thought. The theme has been sounded many times before, sometimes with great philosophical impact, but it is difficult to remember any comparable scientific success. The authors evidently come to the subject from backgrounds in science and teaching, and they have a decided practical cant. It is the doing of science that matters in this book, and the reader is introduced to known fields in a new and surprising manner.

Of course, the whole project may seem dubious on first consideration. We are all aware that scientific observation does not extend to the inner qualities of a human smile, but when has that been a problem to the practice of science? How can we expect to remain “objective” if such subjective impressions as the warmth of human expression must be recorded in our observations? Although these questions spring immediately to mind, it is easy to see that they must be suspended when we come to the more fundamental inquiry of how we came to this objectivity in the first place. After all, if the objective stance is necessary to the practice of science, it cannot be justified by that practice, for we must decide to be objective *before* we can be scientific.

In chapter 2, “The Deeper Roots of Materialism,” the authors examine human sense experience in order to reconstruct the development of materialism and its concurrent notion of objectivity. They are looking for the origin of that *felt* alienation of our consciousness “in here” from the extended bodies of the world “out there” that supports the notion of a rigid separation between the two realms. As one might suspect, their reconstruction does not find means to justify the separation, but rather reason to reformulate the problem. Close studies of perception always undermine the sep-

aration of subject and object by discovering the contribution of the perceiver to the perceived object, but this discussion is unusual in that it is led directly to a reconstruction of Galilean science and its descendants in the third chapter. Thus as the account of experience is reformulated, so is the basis of physics.

But even if the objectivity of science cannot be justified, can we point to anything that is lost by maintaining it? No less a figure than Werner Heisenberg (1958) once argued that since our experience of the world was far richer than scientific objectivity allows, as science progresses “the claim of the scientist to an understanding of the world in a certain sense diminishes.” This diminution, he continued, applies not just to this or that set of phenomena, but to all experience. The advance of science is increasingly bought at the cost of “renouncing the aim of bringing the phenomena of nature to our thinking in an immediate and living way” (p. 33–34).

Heisenberg’s point is useful to the present examination. Perception is immediate — we experience it directly. Yet this intuitive immediacy does not survive scientific description, being replaced by a language of matter, motion, and models. Scientific description does not recognize “how it *feels*,” since this aspect is supposed to be the *effect* of the object “out there” on the perceiver “in here,” and is therefore understood as a modification of subjectivity. The logic is clear, but the premise that reduces our concrete experience of the world to a mere modification of consciousness is suspect. After all, was it not David Hume, one of the fathers of British Empiricism, who noted that it was the “vividness” of sense experience that made us believe in the external world in the first place?

In chapter 4, “Conscious Participation,” we come to the second half of the book’s title — *Imaginative Participation in Science*. The project will be an approach to phenomena that may be said to be scientific even if it does not remove itself from immediate experience. The author’s opening argument qualifies what they mean by *scientific*:

Modern man regards himself as having recently awakened from a dreamlike mythological consciousness which persisted through the Middle Ages. Myths are like dreams, while living in them we do not question their logic. Yet once we awaken, such logic is usually regarded as unsuitable for gaining understanding of the outer world. Being awake means being confronted by experience, which we seek to understand through our thinking. This thinking has already begun when we see anything as a specific “thing.”

Our thinking activity provides the concepts and mental pictures to match the percepts coming from the world around us. Because this happens, to begin with, before we are even conscious of trying to understand the world, we must, as waking human beings, also be critical of our own mental activity: we must be prepared to question whether the mental pictures which accompany outer experience are appropriate. And when we examine outer experience we must always select *one* aspect from a manifold of *many* possibilities. Only when we remain conscious of all these possibilities are we truly awake. A scientific relationship with the physical world can be thought of as a state of equilibrium in which the investigator must balance his focus of attention with an awareness of the whole within which the subject under investigation is found. Maintaining this equilibrium can prevent science from falling asleep and forgetting the processes and experiences which make knowledge possible in the first place. From this point of view... we recognize the danger that models may become myths in which the mind dwells. (p. 73)

During the investigation that follows this introduction, a series of familiar phenomena are brought to mind and to thought, after the manner described. This chapter is the heart of the argument, and the greatest success of the book. No argument *about* science can have the impact of an example *of* science, and the examples here, which are combined very naturally as the mind moves to related subjects, are both relevant and convincing. Most surprising, perhaps, is our own abil-

ity to perform this research, to rethink the complexities of present scientific theorems in terms of the actual elements of experience that provide their basis, and discover that the underlying reality is more immediate, and more intimate, than the "scientific" model.

This chapter provides the best evidence that the authors have made good on their claim to overcome "the postulate of objectivity," as Jacques Monod (1971) called it when he argued that the awakening from mythical dreams demanded the recognition of "an alien world" — i.e., the world of objective science. It seems to me that we all have intimate knowledge of what Monod meant, and therefore good reason to hope that he was wrong and the authors of this volume are right. I am reminded of Schiller's remark to Goethe, after a scientific lecture, that "such a fragmented way of dealing with nature could hardly appeal to any layman who wished to pursue the topic" (1988, p. 20). *Matter and Mind* provides, among its other benefits, a fine gloss on his meaning.

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Eager to Learn: Helping Children Become Motivated and Love Learning

by R.J. Wlodkowski and J.H. Jaynes

Published by Jossey-Bass, San Francisco, 1990.

Reviewed by Devin G. Thornburg

Over the years, a number of comprehensive theories within psychology have included motivational concepts. The study of academic motivation has flourished within educational psychology and has resulted in a proliferation of literature providing teachers with guiding principles for motivating students to learn — usually along a particular theoretical line of thought (Atkinson, 1964; Deci, 1975; Weiner, 1969). Yet teachers continue to cite motivating their students as a classroom problem and a significant challenge to their instructional effectiveness (Freiser, 1987; Warren, 1989). When a child succeeds or fails in school, teachers frequently look to the child's motivation as the reason. In the reviewer's experience, teachers are easily able to

articulate when a child appears motivated to learn. However, there is a more tentative quality to their responses when they define ways in which they can help motivate an individual child. Teachers can express their implicit beliefs about good classroom instruction that include motivational strategies (Clark & Peterson, 1986), but they often describe greater difficulty in evaluating or implementing their beliefs in relation to the motivational differences exhibited by the children in their classrooms (Good & Brophy, 1987). Why, with the gains made in understanding motivational processes, do teachers continue to report uncertainty as to how to encourage the child to show eagerness in learning?

In their book, *Eager to Learn: Helping Children Become Motivated and Love Learning*, Raymond Wlodkowski and Judith Jaynes (1990) have attempted to provide parents and teachers with straightforward guidelines for motivating children while acknowledging the changing and multifaceted nature of their subject. The authors write in the preface to their book that they attempt to "avoid(s) scholarly jargon and use(s) direct and descriptive language" in order to present a series of methods for teachers and parents to motivate their children

(p. xiii). Although they indicate that the methods reflect the experience of parents, teachers, and therapists, a review of the references cited makes it clear that the authors are also drawing liberally from psychological theory and research of motivation. Within certain limits that are either stated and unstated by the authors, they often succeed in their goal.

Insights from behavioral, cognitive, and humanistic systems of psychology are gathered and used to understand earliest development of a child's motivation to learn as well as potential areas where motivational problems during the school years might occur. In several important ways, the book reflects recent theoretical convergences and subsequent shifts in the study of motivation from personal factors to situational factors, from needs to cognitions, and from extrinsic to intrinsic values (Deci & Ryan, 1985; Weiner, 1990; Zimmerman, 1990). Situational factors such as grading practices, homework, testing and television watching at home as they impact on children's motivation to learn are discussed rather than viewing motivation as a stable trait within a constellation of other personality factors and intractable to change. The emphases Wlodkowski and Jaynes (1990) give to testing and grading influences on motivation, in particular, are laudable. Many of the recommendations they make to teachers parallel the recent popular initiatives to create "authentic assessments" in schools (Wiggins, 1987).

Cognitions viewed by motivational theorists and researchers as central to academic achievement, such as attributions, expectancies, and problem-solving and planning strategies, are treated in great detail by the authors. They repeatedly claim that these cognitive processes can be effectively shaped and modified by parents and teachers through modeling, discussion, and evaluative activities, very much in keeping with the findings of recent cognitive research (Deci & Ryan, 1985; Palincsar & Brown, 1989). Wlodkowski and Jaynes (1990) also encourage the use of learning activities that provide children with greater intrinsic interest (for example, collaborative learning and hands-on projects) and tend to deemphasize discussion of extrinsic rewards. Again, recent cognitive research supports their position by offering substantial evidence that rewards can undercut a learner's motivation on an intrinsically meaningful task (Berger, et al, 1990; Brown, Collins & Newman, 1989; Phye & Andre, 1986).

Less explicitly, the authors of *Eager to Learn* address the important links between motivation and other learning factors known to affect achievement, including mastery versus performance orientations towards learning, academic self-concept, as well as metacognition. The mastery-oriented child, for example, tends to


value learning for its own sake, persists on difficult tasks, and is less interested in the outcome of effort than in the effort itself. The performance-oriented child, on the other hand, tends to withdraw from learning when experiencing failure because the outcome of effort and possible rewards for success are viewed as important (Dweck & Leggett, 1988). Wlodkowski and Jaynes (1990) appear to outline methods for creating a mastery orientation within children. Lyon and MacDonald (1990) have recently conducted research that substantiates the significant contribution academic (versus general) self-concept plays in motivating the child to achieve. The authors of *Eager to Learn* also treat the child's self-concept as a central concern for parents and teachers. In addition, they view children's goal setting activity as an important part of sustaining the motivation to learn, proposing that setting goals is a metacognitive process (reflection upon one's own knowledge and capacities for a task) that can help maximize the child's expectation of success. The potential connections between metacognition and motivation touched upon by the authors have been recently speculated about by cognitive researchers (Duell, 1986; Weinert & Kluwe, 1987).

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Taken together, the book's elements described above illuminate two deeper assumptions that Wlodkowski and Jaynes (1990) seem to make about motivating children: that parental or teacher encouragement should be aimed at the child's increasingly integrated sense of self rather than a specific behavior, goal, or perception, and that the child's love of learning ideally involves a view of learning as a process rather than an outcome. Interestingly, these are similar to the conclusions reached by John Dewey (1913) about motivation eight decades ago. Yet, in their effort to provide motivational techniques emphasizing a wholistic, process-oriented view of children, the authors appear to downplay the importance of motivational differences between children.

There are several important omissions in the book concerning class and cultural differences in motivational research, for example, that the authors explicitly address in an early chapter. Although they do cover Clark's (1987) research of lower-income families identified as effective in facilitating children's school motivation as well as studies of Japanese children's sources of motivation to exemplify cultural influences on school achievement, Wlodkowski and Jaynes (1990) make the decision to focus on the "mainstream child." Their choice has several, apparently unintended, consequences within their proposals.

There are guidelines offered for parents attempting to communicate to their children a love for learning. Parents who treat mistakes as instructive for future learning, who help the child see their responsibility in learning, and who help the child value knowledge and competence over grades are viewed as most effective in facilitating the child's motivation to learn. Yet there is significant research evidence that these values (which the authors do present as such) are not shared by all social classes and cultures and that these values may not be instrumentally related to the motivation of children (Dunn & Griggs, 1990; Lee, 1990; Richardson, et al, 1990; Sanders & Wiseman, 1990). At another level, the school itself has an organized culture that influences the individual's motivation (Fyans & Maehr, 1990; Wiener & Vardi, 1990).

The authors also describe specific strategies for effective teacher/parent communication. Teachers and parents are encouraged to assume collaborative responsibility for a child's motivation, as to do otherwise would be to blame one another for learning problems the child might experience. Wlodkowski and Jaynes (1990) also claim that parents from lower-income communities or "cultural minority" groups might experience the school as alienating or intimidating and might, therefore, be viewed as uncooperative by teachers. All of these points imply, at the minimum, an antagonistic relationship between families from certain communities and the school. There are, however, other possibilities, including the notion that families might perceive the school as the primary socializing agent of their children — not an alienating or intimidating place. Considerable research has accumulated over the years, for example, that parents of diverse backgrounds may not view school problems as their own responsibility, deferring to school officials as the experts (Anastasiow, 1986; Golding, 1990; Heath, 1983).

Wlodkowski and Jaynes (1990) are less self-conscious in qualifying their proposals for children in regards to age and gender differences. Adolescent motivation is largely treated as a footnote in the text, addressed in terms of the distracting allure of the youth culture outside of the school and the notion that teenagers may not outwardly portray motivation as achievement or concentration in the way younger children do. Although these are important points, the motivation of an adolescent is viewed by many researchers as qualitatively different from that of a younger child (Ames & Ames, 1989; Egan, 1990; Masselam, et al, 1990; Wood, et al, 1990). With such differences, is it perhaps premature to assume that the same types of strategies will be effective to motivate children of varying stages of development? Gender differences in academic moti-

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vation are not dealt with at all by the authors. It is unclear whether they assume that any differences noted in girls' versus boys' motivation are more of degree than kind, but there has been no consensus reached by psychological researchers about, for example, potential gender differences in the motivational processes involved in academic achievement (Becker, et al, 1990; Stipek & Gralinski, 1990).

Eager to Learn is noteworthy for the authors' treatment of academic motivation as a process that involves the child's entire sense of self. The advice Wlodkowski and Jaynes (1990) offer to parents and teachers are well grounded in some time-honored and current ideas about how motivation occurs and how it can be developed. But the increasing importance of motivational differences in regards to class, culture, gender and age are largely left untouched by the authors. One would hope that future work they do in this area would more clearly reflect the increasing diversity of children in our society.

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Letter to the Review

Dear Holistic Education Review:

I won't speak for John Gatto, but I must address the issues raised by Ron Miller about John Holt and homeschoolers in his review of *Dumbing Us Down* (Holistic Education Review Summer 1992).

First, and most important, John Holt and homeschoolers are not John Gatto. Gatto's book stands on its own merits; indeed, Gatto mentions homeschooling in just one essay, his speech to the New York legislature. That I as an individual, and homeschoolers in general, view Gatto as a friend and ally does not necessarily mean that we agree with everything he says, writes, or does. Indeed, Gatto's "Exhausted School" program at Carnegie Hall proves that he believes in a pluralistic approach to solving education's problems. He is an unwavering supporter of any form of school choice that will undermine the monopoly that government schools have on young people. That many of those whom Gatto invited to speak at Carnegie Hall have reservations or outright opposition to this position is a tribute to Gatto's social consciousness and generosity.

Miller's assertion that John Holt and homeschoolers need to be more socially conscious is a canard. Holt left, and many homeschoolers now leave, school so they may directly involve themselves and their children in making a better world now. John Holt wrote in 1971, six years before he fully embraced homeschooling:

I do not think we can treat as separate the quality of education and the quality of life in general.... I am saying that truly good education in a bad society is a contradiction in terms. In short, in a society that is absurd, unworkable, wasteful, destructive, secretive, coercive, monopolistic, and generally anti-human, we could never have good education, no matter what kind of schools the powers that be permit, because it is not the educators or the schools but the whole society and the quality of life in it that really educate. This means that whatever we do to improve the quality of life, for anyone, and in whatever part of his life, to that degree improves education.... The best and per-

haps only way to prepare the young to work for a better world is to invite them, right now, to join us in working for it. We cannot say, "We will concentrate our efforts on making nice schools for you, and after you get out you can tackle the tough job of remaking the world."... What [people] need above all else is a society in which they are to the greatest possible degree free and encouraged to look, ask, think, choose and act; and... making this society is both the chief social or political and educational task of our time.

This is hardly the "libertarian social philosophy" described by Miller. We most certainly hold and defend aspects of the libertarian educational philosophy, which I think is best described by George Dennison in *The Lives of Children*, but the entire issue of homeschoolers, particularly ones inspired by Holt, as merely waiting for the "Invisible Hand" to take care of social inequalities is completely off-base. Homeschoolers are not waiting for invisible hands, but are providing real, live, big and little hands working together to create new learning opportunities. That they can do this work successfully outside of schools demonstrates a choice for the many who can't afford private schools, who don't like or perform well in schools, who seek options to the traditional, school-oriented family life, who want other routes for earning credentials for employment, who prefer to address their social problems directly by working actively for social change rather than spending their years being taught about society's ills or, worse yet, kept ignorant of them.

Miller apparently agrees with Gatto's "seven lessons" taught in school. Gatto describes how these lessons constitute the "hidden curriculum" of schooling. Gatto's point here is that any school "community" cannot escape imparting these hidden lessons to children as long as school is based on the premise that children need to be taught separately from the rest of society by trained professionals, and children have no choice but to join these communities. To agree with Gatto's seven lessons, and then

later say Gatto and homeschoolers are "throwing the baby out with the bathwater by categorically defining 'school' as an impersonal network" is paradoxical.

What Miller may not be aware of is that John Holt often wrote admiringly of learning situations that are not school situations, such as the Danish Ny Lilleskole, now known as Friskolen 70, and the British Pioneer Health Center (also known as the Peckham Experiment), government-subsidized social solutions that would be anathema to libertarian social thinking, as far as I can tell. Holt was, as Gatto is, actively involved in local and national politics: George McGovern, who is probably as far afield from libertarian social philosophy as you can get, wrote the introduction to the posthumous edition of Holt's *How Children Fail*. This is no surprise since Holt was an outspoken support of McGovern's candidacy.

I respect anyone's decision to try and make schools nurturing communities; I only wish homeschoolers would get the same respect for their decision to make nurturing communities without schools. I keep hoping that apologists for the schools who, like Miller, seek to change them into more humane places will stop viewing homeschoolers, many of whom tried unsuccessfully to change schools themselves or who still teach in schools, as obstacles, but as allies working on a different front of social and educational change.

As to social engineering: It has been under attack for well over twenty years by the "holistic/radical" educators Miller mentions, yet there are few signs that grading and labelling within the education establishment are diminishing as a result. Indeed, my worry, articulated by Illich and Holt in their writings too, is that in a "free market of education consumers," these credentials, and job opportunities based on properly paid-for and tested credentials, will create a society even more stratified and impoverished than the one we currently have. Homeschooling di-

rectly addresses this problem by saying no to traditional school credentials. In the same issue of *Holistic Education Review* there are several articles that celebrate the work of Howard Gardner. I find these articles bothersome not because of the insights into multiple intelligences Gardner presents, but because of the total lack of criticism of Gardner's idea that by using his theories we can better use schools to pump out more mathematicians if that is what some elite decides we need for the economy (see *Frames of Mind*, p. 392). This is social engineering in its rawest

form.

John Holt wrote extensively that merely doing away with compulsory schooling is not enough, that we must also address the issue of school's separation of children from the world and concerns of adults, and the issue that the vast majority of schooling separate living from learning. Homeschooling may not be the only way to address these issue, but it does at least provide some immediate and encouraging new paths for people seeking change.

I am not presenting homeschool-

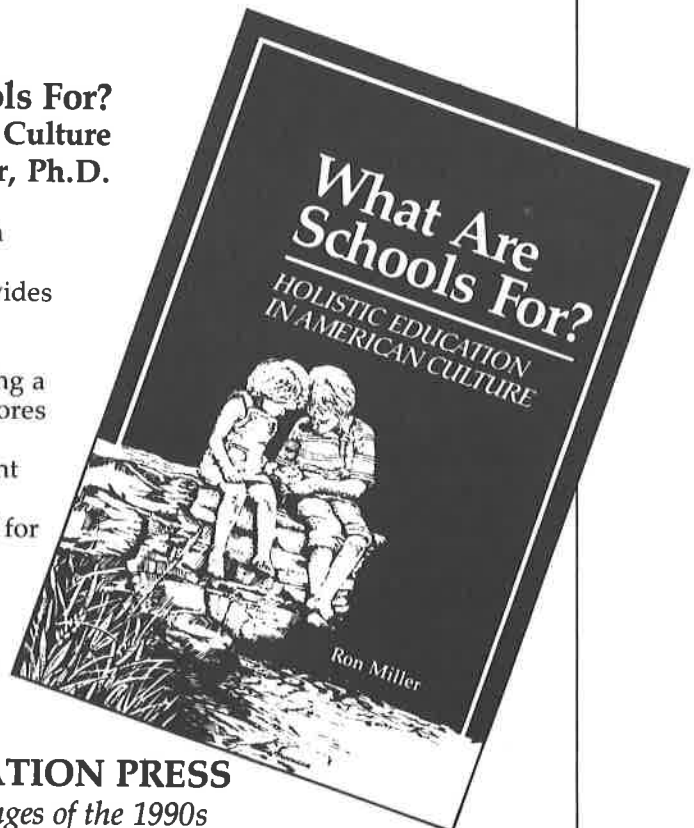
ing as the panacea for all our social troubles, but it is part of the answer. *Dumbing Us Down* is an important book, but it's a shame that Miller's review should contain a reductionist view of Holt's thinking and homeschoolers' actions as an avenue to present the "holistic/radical" viewpoint as more socially conscious than any other.

Sincerely,
Patrick Farenga
President, Holt Associates Inc.

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