

ONE

INTRODUCTION

The consequences of abusing the environment with the waste products of a technological/consumer-oriented culture are becoming part of the consciousness of an increasing number of citizens. But their political activities mostly are limited to addressing the dangers of deadly toxins that are being released into the air, soil, and ground water in their neighborhoods. Aside from the more focused and energized environmentalists and supporters of the deep ecology movement who study, write, and, in general, devote their lives to raising consciousness about the threatened condition of various ecosystems, most citizens appear not to recognize the connections between the Western ideas and values they were inculcated with in schools and universities, their consumer-oriented life style, and the depletion of fish stocks, aquifers, old growth forests, petroleum reserves, and the accumulation of toxic wastes at all levels of the biosphere. In effect, the cultural message systems that sustain the images and values upon which the consumer-oriented society rests continue unchallenged to reinforce the taken for granted attitudes toward material progress and individual opportunity—even as the evidence mounts that the destruction of the environment now puts the entire technological/economic infrastructure at risk. The schizophrenic condition that now characterizes people's lives, where concern about the immediate impact of degraded environment on health and economic well-being is kept separate from the critically important existential and cultural questions relating to "how much

is enough?," to quote Alan Durning's fundamental question (1992), may very well continue until it is too late to affect the necessary cultural changes.

This pessimistic prognosis is based on an awareness that people's thought processes and value frameworks are deeply embedded in the taken for granted patterns of everyday life. In effect, the locus of deep and long lasting change is at the preconscious level of a culture's symbolic foundations that provide answers to how human purposes and relationships are to be understood. Yet the primary agent of political action is the person whose experience and thought/value processes are at odds with some aspects of these otherwise taken for granted cultural patterns. Individual members of a culture may make explicit certain cultural patterns, such as gender discrimination in schools and the work place, but continue to reinforce other taken for granted patterns—such as the belief that change is progressive and that the individual is the basic social unit. It is this deeper level of shared, taken for granted, cultural knowledge that makes addressing the ecological crisis so problematic. The deepest assumptions of the culture, in effect, often go unrecognized even in the face of the most radical political action. The result is that well intentioned efforts at political reform may actually strengthen the deeper and more hidden traditions of the culture. For example, recent efforts to win greater equality of opportunity for various minority groups, while successful in terms of transforming certain aspects of taken for granted patterns, did not alter the deepest levels of cultural knowledge that drive us collectively to develop certain forms of technology over others, and to continue to reward people whose economic behavior degrades the environment—to cite just two examples. Similarly, the recent rethinking of the hierarchical and deskilled nature of the work place, which was prompted by the more cost effective Japanese approach, has not altered the deeper held assumptions about the need for expanding the cycle of economic/technological development in order to raise the consumption level of the entire population of the world.

The awareness that the ecological crisis is, in part, a crisis in cultural values and beliefs leaves us with some difficult questions. How fast can a culture change itself? What are the leverage points for affecting fundamental changes that are needed if we are to achieve the goal of an ecologically sustainable culture? What is the nature of an ecologically sustainable culture? Do the changes have to be evenly orchestrated? That is, how do we reconcile certain specific changes where the sources of injustice seem obvious (such as provid-

ing for economic opportunities for otherwise excluded social groups) with the need to change ecologically destructive economic values and practices? If we look at the length of time it has taken to alter cultural beliefs relating to gender and racist attitudes, the answer to questions relating to the culture's ability to change itself in the time span that may be necessary to avert ecological disaster may be disheartening indeed. But doing nothing in the face of the glacial pace of cultural change does not seem to be a viable alternative.

Formal education appears both very powerful in terms of conserving the deepest and largely unconsciously held patterns of modern culture and, at the same time, as one of the few public forums we have for developing a critical understanding of the crisis we are now in. Both the civil rights and feminist movements focused attention on the need to change the content of the curriculum at all levels of education, as well as the taken for granted attitudes of teachers and professors. Public schools and universities are again being singled out as a critical leverage point for affecting changes in America's ability to compete in the global economy. And to a lesser extent public schools are being viewed as sites for learning about recycling and other environmentally sound practices. While the ability of public schools and universities to fulfill the social missions assigned to them over the last few decades is still not fully determined, it is nevertheless safe to assume that their conserving role in other areas of culture continues unchallenged.

The irony is that the ways of thinking and valuing reinforced (conserved) by public schools and universities are still viewed by most educators as expressions of the most enlightened and progressive aspects of modern culture. But as I shall develop the argument in this book, this would be a totally incorrect way of understanding the nature of these beliefs and practices. The ecological crisis, for most people, is experienced directly in terms of economic dislocations, toxins that are changing the chemistry of our bodies, and changes in the carbon cycle that alter weather patterns. These direct experiences, in diverging from the expectations that people have been culturally conditioned to accept, now force us to confront more directly the mythical foundations of mainstream cultural beliefs and values. In effect, the ecological crisis forces us to confront the problematic aspects of culture that would otherwise remain part of our taken for granted background knowledge. But it has not yet brought into question the core beliefs and values taught directly and indirectly at all levels of the educational process. The progressive and modernizing nature of beliefs and values promoted in public schools and univer-

sities make sense only within the context of the myth of social progress. This myth, as we are now beginning to understand, is predicated on an anthropocentric view of the universe and the further assumption that our rationally-based technology will always enable us to overcome the breakdowns and shortages connected with the natural world. Given the scale of ecological disruption, it is becoming increasingly difficult to maintain the interlocking set of myths that represent the primacy of human interests and technological empowerment. Beliefs and values once regarded as basic aspects of a modern and progressive form of consciousness, when viewed against the devastating impact that modernization has had on natural systems, now appear as reactionary and as contributing to deepening the crisis. This is the double bind that most educators have not yet recognized.

Part of the statement presented to the General Assembly of the United Nations by the Union of Concerned Scientists (which was signed by 1600 scientists from 70 countries, including 100 recipients of the Nobel Prize) will put the discussion of the conceptual foundations of current educational theory, research, and classroom practices in the proper perspective. The joint statement included the following warning: "A great change in our stewardship of the Earth and life on it is required if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated. The Earth is finite. Its ability to absorb wastes and destructive effluent is finite. Its ability to provide food and energy is finite. And we are fast approaching many of the Earth's limits" (1993, p. 2). The amount of time the scientists estimated we have for changing destructive cultural values and practices is a mere forty years. Given the slow pace of deep cultural changes, as opposed to the rapid rate of the more surface level technological changes, their warning has to be taken seriously—even if they are grossly underestimating the number of decades it will take us to reach critical thresholds in the life sustaining capacities of natural systems. Indeed, the need to reconstitute the deep foundations of cultural beliefs and behavior would be just as great if their estimate had been one or even two hundred years. This sense of urgency is also reflected in Vice President Al Gore's appeal to "make the rescue of the environment the central organizing principle of civilization" (1993, p. 269).

Before identifying the bedrock educational beliefs that have been overtaken by recent advances in understanding the influence of culture on what previously were regarded as individually-centered processes of rational thought, creative expression and moral decision

making (now made reactionary ways of thinking by the evidence of ecological disruption) it would be useful to clarify how the phrase “ecologically sustainable culture” is being used. While it is possible to identify non-Western cultures as examples of ecologically sustainable cultures (e.g., traditional Hopi and other American Indian cultural groups, Australian Aboriginal tribes, indigenous cultures in various regions of the world prior to the impact of Western modernization), their traditions, technologies, and economic/political systems were based on meta-narratives that were fundamentally different from those of Western cultures. The use of these cultural groups as models for evolving our own ecologically sustainable form of culture is further complicated by the fact that we are largely urbanized and now dependent upon a technologically driven division of labor that has left most people lacking in the basic skills and knowledge essential to a bioregional and community-centered life style.

Yet, for all the unique characteristics of the Western approach to modern existence, it is still necessary to establish a general reference point that can be used to assess whether our own cultural evolution is in the direction of ecological sustainability, or is continuing on the pathway of expanding material expectations that place the Earth’s ecosystems under increasing stress. Aldo Leopold, the author of the modern classic on ecologically-centered thinking, provides a moral framework for judging whether human behavior meets the hard test that must be met by all ecologically sustainable cultures. According to Leopold, “A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise” (1972 edition, p. 262). Although Leopold’s writings are vague about whether the “land ethic” is to be centered in the rational judgment of individuals (which would make its moral authority contingent upon the personal whim and assessment of self-interest—always an unpredictable situation) or in the symbolic languages that sustain the cultural life of the group, he is very clear and precise about what constitutes the fundamental basis of moral judgment. Whether viewed as individually or culturally centered, behaviors are wrong in every sense—morally, politically, educationally, economically, and ecologically—if they threaten the “integrity, stability, and beauty of the biotic community.” In effect, behaviors that undermine the viability of the energy and information webs upon which humans and other members of the biotic community are absolutely dependent are to be judged as ecologically unsustainable. The shift implicit in Leopold’s land ethic, as George

Sessions and other deep ecology supporters have pointed out, is from an anthropocentric to an ecocentric way of understanding how humans relate to the rest of the world (1992, p. 64).

Alan Durning uses a slightly different vocabulary for articulating the essential criterion for judging the pathway of culture development. The new Golden Rule, as he puts it, "is simple: each generation should meet its needs without jeopardizing the prospects of future generations to meet their own needs" (1992, p. 136). Like other profound moral templates, the basis for determining whether the Golden Rule has been transgressed is simple, clear, and free of ambiguity about competing interests. But it does shift the emphasis away from the traditional liberal concern with using the well-being and self-determined interests of the individual as the basic social unit for determining the moral tenor of social life.

The straightforward simplicity of these moral dictums has not been matched by our efforts to address the many dimensions of the ecological crisis. Our first steps to locate an ecologically sustainable pathway, particularly efforts by the federal government, threaten us with a new form of fascism now made increasingly possible by the marriage of the panopticon potential of computer technology (in collecting data on people's behavior) with the progressive centralization of political power in federal and state bureaucracies. With this danger in mind, I would like to use the sparsely formulated criteria of Leopold and Durning as the moral/political/educational reference point for suggesting areas of cultural transformation that may help put us on a less fascist pathway for dealing with the ecological crisis. This change in the foundations of taken-for-granted beliefs will require us to develop the same sense of a natural attitude toward ecologically sustainable cultural practices that now characterizes our natural attitude toward a consumer/technologically driven life style.

The need to reconstitute the deep foundations of culture in ways that make possible more ecologically oriented taken-for-granted beliefs and values should not be interpreted to mean that this should be the only focus of attention. Reforms such as those recently urged by the Worldwatch Institute, and echoed in the recommendations of other national and international groups, must also be pursued. The Worldwatch Institute's list of essential reforms include: "Reestablishing climate stability, protecting the stratospheric ozone layer, restoring the earth's tree cover, stabilizing soils, safeguarding the Earth's biological diversity, and restoring the traditional balance between births and deaths" (1993, p. 17). Efforts to shift from fossil

fuels to solar energy, to introduce more energy efficient technologies into all levels of human activity, and to develop more sustainable ways of using fresh water are also essential to matching future economic/technological infrastructures with what natural systems can sustain over the long term. Efforts to achieve these ends will bring about changes in other areas of the world's cultures, with the biggest changes occurring in those cultures that have abandoned folk community oriented traditions for the more individually-centered consumer lifestyle. But the changes in cultural beliefs and values will not be automatic, or free of reactionary developments—as we witnessed in the case of how federal civil rights legislation introduced changes that were not matched by changes in people's taken-for-granted beliefs and behaviors.

Although a strong case can be made that fundamental cultural changes occur more slowly in public schools and universities than most social reformers would like to acknowledge, they remain arenas in which the problem of evolving an ecologically sustainable culture needs to be addressed. Regardless of whether public schools and universities are viewed as on the leading edge of cultural change or as institutions that help perpetuate ecologically destructive traditions associated with modernism, they are not without influence—particularly when teachers, professors, and curriculum materials are working at cross purposes with the direction of reform that is now needed. Socializing the next generation to understand the nature of cultural changes decided upon through the political process, and to developing taken-for-granted attitudes toward behavioral patterns that are consistent with the agreed upon changes, is vitally important to ensuring that these political agreements are not continually reopened and contested. For example, much of recent environmental legislation is based on the recognition of the dependency of humans on the viability of natural systems. The purpose of the legislation, whether it has to do with protecting salmon migration patterns, protecting fresh water from contamination and other misuses, or curbing pollution in urban areas, is undermined when public schools and universities reinforce the old set of cultural beliefs that represent the individual as the epicenter of the universe. Similarly, as we begin to recognize that a more ecologically-centered form of existence will require more attention to the storage and sharing between generations of knowledge that has proven over time essential to group survival (such as agriculture and forestry techniques that have evolved in response to the characteristics of local ecosystems) the current emphasis on students learning from their own direct experi-

ence (which is more a feature of public schools), and learning to associate experimental forms of knowledge with social progress, will be recognized as contributing to yet another double bind.

The following chapters, in effect, can be viewed as an attempt to initiate a discussion about the nature of a series of double binds that characterize the relationship between deeply held cultural assumptions that guide the processes of inquiry and theory building, educational goal setting, and classroom practices. Many of these cultural assumptions frame how professors understand the nature and purpose of their own inquiry process, as well as their approach to teaching and curricular decisions. But the main focus will be on how these double binds relate to public education and, more specifically, to the education of teachers. It is at the level of public school education that the most basic schemata of the culture are systematically presented and reinforced. It is hoped that the re-conceptualization of the ways of thinking that create these double binds will contribute to the "greening" process becoming more visible in universities.

The primary focus in chapter 2 will be on the ways in which the educational establishment over the last several decades has understood the problem of moral education. As theorists of moral education, as well as classroom teachers, shifted from a student-centered values clarification approach to the more developmental stages of moral reasoning advocated by Lawrence Kohlberg, the primacy of the individual as the agent of moral decision making remained a constant. A second constant was that moral choices should be the outcome of an individually-centered rational process. A critical issue raised by the rational, individually-centered approach to moral education is whether it can avoid the problem of nihilism where shared moral norms are relativized as individuals decide in accordance with their own reflections and emotive responses. There is also the question of whether this more deliberate approach to moral education, with its accompanying assumptions about the autonomous nature of the individual, corresponds to the multiple ways that the languages of a cultural group encode at a tacit level the shared assumptions about how relationships (human with human, and human with non-human) are to be conducted. Most of human history has involved the use of cultural patterns (analogs) as the primary means of moral education. I shall argue that this process also occurs in the dominant culture, but is fundamentally different from the approaches to moral education found in more ecologically-centered cultures. I shall also argue that since the use of all languages that sustain the patterns of a culture are about relationships, and encode the cultural group's

taken-for-granted moral schemata, the entire curriculum reinforces the moral conventions that govern how different relationships are experienced and, in some instances, even understood.

If our approaches to moral education are predicated on overly optimistic assumptions about autonomous individuals being able to reach moral decisions that reconcile their interests with those of the larger community and, now, with the ability of the biotic community to reproduce itself, perhaps we ought to step back in order to ask whether this is a viable approach to evolving a culture where self-limitation for the sake of others (the other beings that make up the ecosystems, nonhuman systems and process, future generations, etc.) can become a taken-for-granted attitude toward existence. Moreover, if our approaches to moral education reinforce other modern assumptions about the efficacy of new (experimental) values and the primacy of individual judgment in relationship to the natural world, we have then even more reason to ask whether the culture taught in schools is reactionary and out of step with evolving a more ecologically, as opposed to anthropocentric, form of culture.

Any relevant discussion of moral education must also address the question of how moral values are communicated to the young in cultures that have evolved along more ecologically-sustainable pathways. Understanding the context in which moral values are taught, how their approaches to moral education incorporate a land ethic and why the youth of these cultures accept the moral teachings of their elders (instead of seeking their own sense of identity and freedom from external authority), may provide insights into the limitations of our approaches to moral education.

Chapter 3 will be used to examine a second sacrosanct goal of educators at all levels of formal education that may now represent, as I shall argue, a reactionary way of thinking. Creativity has been a guiding metaphor both for American educators and modern artists. While postmodern artists now view creativity as a problematic metaphor, and are even beginning to ask about the artist's responsibility for communicating a more ecocentric way of understanding and valuing (Gablik, 1991), mainstream educators continue to think of creativity as a goal that will, if attained, free each student's unique power of origination in the areas of ideas, values, and expression. The cultural assumptions that are at the core of the educational establishment's anthropocentric world view are fully represented in the following statement by two art educators. In a position paper written in 1992 for the National Art Education Association, Cynthia Colbert and Martha Taunton explain that

Through creating art, children understand and experiment with various sources of inspiration for creative work. They develop *their own ideas* for expression and use their understanding of materials, creative problem solving, observation, and imagination skills. Children learn to select, control, and experiment with a variety of art tools, materials, and processes to create two and three dimensional forms. From creating *their own works of art*, children learn how and why other people create art and understand that art has personal meaning to the creator (1992, p.1, italics added).

This set of ideals can be sustained only if other cultural assumptions are still taken for granted, like the assumption that original ideas and forms of expression contribute to the onward march of social progress. There is also the assumption that students must reach deep within themselves to find and activate the nascent powers of original expression. But this image of the creative individual does not take account of the influence of culture on thought, identity, and expression. It also represents the individual as separate from the environment.

Colbert and Taunton's view of the creative individual is widely shared by professors of teacher education, and by most public school teachers who struggle daily against the intrusions of street violence, economic disruptions that affect the home environment, and myriad other social problems in order to educate students to the values and beliefs of modern culture. Developing the student's potential for creative expression has thus become one of the highest goals to strive for. But if we look at this ideal from a historical and cross-cultural perspective, as well as how it relates to the ecological crisis, it suddenly becomes exceedingly complicated—even problematic.

Tracing how the metaphorical image of being "original" has changed over the last two thousand years of Western history, and exploring how educators borrowed their image of creativity from artists who were themselves engaged in an ideological struggle with what they regarded as the stifling and materialistic values of bourgeois culture, would help illuminate how the educator's way of understanding creativity is an expression of modernism. But I shall take a different tack, one that frames the discussion of creativity within a cultural/environmental context where linear progress can no longer be taken for granted. Part of the discussion needs to foreground the culture/individualism connection, and thus expose the mythic image of the student represented in the commonly used phrases as

"their own ideas," "creating their own works of art," and so forth. An equally critical part of the discussion must address how modern art, which educators use as an analog for their own understanding of the creative process, encodes cultural assumptions that represent humans in a dominating relationship to the environment.

As the educator's way of understanding the creative individual is an expression of the modern, pre-ecological consciousness, it is necessary to introduce a comparative perspective into the discussion, particularly if we are to escape the limitations of our own ethnocentrism. Among the questions that need to be asked are: How is creativity understood and expressed in cultures where the person, community (as living tradition and future), and all the members of the biosphere are experienced as connected and as sharing a common fate? A second question that may help make more visible the modern ideology of the educator is: How do creative members of ecologically-centered cultures balance the need for individualized expression with the need to deepen and restate the traditional symbolic knowledge that has contributed to the survival of the entire biotic community? One of the great ironies surrounding the modern educator's ideal of creativity is that the type of individualism they wish to foster has not stood out as an exemplar of ecological sensitivity or, for that matter, as a critic of the culture's assaults on the environment. In order to reframe the discussions that are going on within special groups of educators concerned with creativity, giftedness, and art education (which are both separate and interconnected discussions), I will argue that the destruction of the environment confronts us with the need to make a radical shift away from the current emphasis on individually-centered creativity, and toward a greater emphasis on using the arts as a form of cultural storage that enhances communication between generations, and across species, about how to live in ecologically sustainable relationships. As critics are likely to claim that I am submerging individual creativity into group processes, I want to emphasize that a more ecological understanding of creativity should not be interpreted to mean that there would be no individualistic expression, interpretation, and renewal of cultural patterns. Rather, it would represent a form of a rebalancing of the individual's relationship with the larger culture, as well as with the life sustaining characteristics of natural systems that make individual/cultural life possible. The modern idea of the creative individual fails to recognize these interdependent relationships, and thus must be viewed as an example of the dualistic thinking essential to maintaining the idea of an autonomous individual.

While one segment of the educational establishment is urging

more emphasis on fostering creativity, another segment is presenting the argument that computers need to be made a more central part of the educational process if students are going to be prepared fully for citizenship in the dawning of the Information Age. Chapter 4 will examine two characteristics of educational computing largely ignored by educators in the field of educational computing and by business interests committed to extending the use of computers into more areas of the educational process. The first characteristic relates to how the uses of computers for the purposes of doing simulations, storing and manipulating information, word processing, and so forth, also mediates the larger experience of culturally embedded existence. The word "mediate" suggests that the cultural/mental processes encoded in the design of computer programs and operations both selectively amplify and reduce the kinds of knowledge, forms of communication, and ways of knowing experienced by the student. But as the amplification and reduction processes involve cultural patterns often taken for granted by students, the full extent of the shaping influence of the computer goes unnoticed. In effect, *as the student uses the computer for specific educational purposes, the computer is helping to alter the symbolic foundations of the student's culture.*

The critical issue, in terms of the problem of cultural demands exceeding the Earth's natural resources, relates to which cultural orientations (ways of knowing, how human/environmental relationships are represented, view of language, etc.) are reinforced through computer-mediated thinking and communicating. I shall develop the argument that the cultural orientations amplified through educational computing are the very same cultural orientations that have contributed to destroying the environment in the name of progress: an anthropocentric view of the universe, an instrumental way of knowing, a view of knowledge that maintains the mythic dimensions of modern science where facts are kept separate from values, the emphasis on individual thought as being based on data, and the assumption that new and experimental knowledge should have more authority in people's lives than forms of knowledge that have evolved over generations. I shall also lay out the argument that computers contribute to the double bind where what we most need to know is hidden by the increasing amounts of data; that is, the deep taken for granted cultural assumptions that underlie the cognitive schemata we use as the basis for relationships with each other and the environment. To put this another way: if the cultural patterns formed during that time in Western history when humans under-

stood the primary issues of survival in terms of acquiring power to bring nature under control represent the most critically important educational challenge we face today, the more widespread use of computers in educational settings will contribute more to hiding these patterns (even reinforcing them) than to the process of learning more ecologically sustainable patterns. Indeed, if we do not address the deep cultural foundations of our individualistic/consumer-centered life style (which is now being made an even more critical issue by the expanding world population that is being encouraged to contribute to the growth of the world economy) the information highways that are to serve as the electronic infrastructure of the Information Age are going to be overwhelmed by the collapse of natural systems. Ironically, computers provide us a window (information) for recognizing the early warning signs of over stressed ecosystems, but they also mesmerize us into thinking this is the primary form of knowledge we need for correcting the problem.

Another key building block supporting the edifice of educational orthodoxy is the view of intelligence as an attribute of the individual. Why this is a conceptually inadequate basis for education, even reactionary in light of the ecological crisis, will be the focus of chapter 5. John Dewey located intelligence in the transactions (guided of course by the fusing of the scientific method of problem solving with the principles and values of a participatory democracy) between individuals and the problematic aspects of their social environments. But most theorists, researchers, and classroom teachers who make up the educational mainstream ignored Dewey's partially-correct insights. Instead, some opted for the behaviorist position where the agency of intelligence is replaced by the contingencies of reinforcement in the environment, while others continued to embrace the long-standing myth that locates intelligence as a mental process that occurs in the brain of the individual. The most recent representation of the latter position stresses the individual's activist role in constructing knowledge and, by extension, choosing one's own authentic values. In the early eighties, Seymour Papert's influential book, *Mindstorms*, provided an alternative to the image of the passive individual required by the social engineering orientation of behaviorist psychologists and educators. Papert's view of the individual as a constructor of knowledge is clearly articulated in the following advice to people who design educational software: "When knowledge can be broken into 'mind-size bites,' it is more communicable, more assimilable, more simply *constructable*" (p. 171, *italic added*). In his more recent book, *The Children's Machine*,

Papert acknowledges that "constructions in the world" may have something to do with "those in the head." But his question, "How can one become an expert at *constructing* knowledge?" indicates his continued belief that intelligence is an individually centered activity (1993, p. 143, *italic added*). Robert J. Sternberg, a Yale University psychologist who is a leader in the field of cognitive psychology, refers to intelligence as "what goes on inside a person's head when he or she thinks and behaves intelligently" (1987, p. 194). A leader in the field of artificial intelligence, Marvin Minsky, uses a different metaphor to represent intelligence as individually centered: "Our conscious thoughts use signal-signs to steer *the engines in our minds*, controlling countless processes of which we're never much aware" (1986, p. 56, *italics added*). Even Howard Gardner's seven forms of intelligence are represented as attributes of the individual.

Theorists and reformers who translate cognitive principles into teaching strategies for the classroom tend to fuse this so-called scientific view of the individual's cognitive activity with liberal ideology, thus making it even more difficult to challenge this view of intelligence as excessively narrow and based on outmoded assumptions. Witness the following statement by Barbara Z. Presseisen, which she wrote for the National Education Association's School Restructuring Series: "At the heart of the new view of curriculum *cum* thinking is an acceptance of the constructivist-developmental psychology and an appreciation that, over time, every student can become a more adept *builder of his/her own knowledge system*" (1990, p. 148, *last italics added*).

As long as social progress and development of the individual's autonomy are the primary social reference points, there will be no reason for challenging the cognitive principles that now guide the most recent educational reform efforts. And even though the cognitivist position, and its variant forms of expression, does not take adequate account of the many ways intelligence is embedded and encoded in the communication/symbolic systems and artifacts that make up the cultural ecology superimposed on natural ecosystems, few educational theorists or classroom teachers possess alternative conceptual frameworks that would allow them to challenge it. The various layers of the educational establishment carry on a highly successful process of socializing classroom teachers with a metaphorical language that sustains the "reality" of the individually-centered view of intelligence, but carefully avoid introducing alternative language/epistemological/ideological frameworks necessary for a different way of understanding. But this orthodoxy must be

challenged and replaced if we are to break with the long tradition of ignoring how our current cultural ways of knowing still misrepresent how the fate of humans is dependent upon changes taking place in the environment, and how limited "human intelligence" is when natural systems become stressed and undergo rapid change.

The task of rethinking the nature of intelligence is immense, as it will involve developing a new language that will allow us to think within the framework of less anthropocentric ideologies and to represent more fully the cultural and ecological nature of intelligence. Bateson's "ecology of mind" and what Humberto R. Maturana and Francisco J. Varela refer to as the structural coupling of autopoietic systems will help in this task. Just as who we are depends upon who we are interacting with, how we think, behave, and value depends upon the intelligence immanent within the dynamic patterns of the larger systems within which we find ourselves. This view of intelligence involves abandoning the Cartesian representation of the individual as spectator of an external world and, now, manipulator of data. Instead, we need to adopt a view of the individual as an interactive member of the larger and more complex mental ecology that characterizes the culture/environment relationship. The various interpretations of intelligence as an attribute of the individual leads to educational situations where students' thoughts and behaviors are judged as manifesting "intelligence," even when they contribute to degrading the environment. An ecological view of intelligence introduces a different and more complicated set of criteria for judging the expression of intelligence. Contributing to the long-term sustainability of the ecosystems, and thus to the survival of the culture, should become one of the criterion now missing from current educational thinking. Why this is the ultimate test of intelligence, what the other criteria should be for judging intelligence, and what the implications of an ecological way of understanding intelligence would be for learning in the classroom and elsewhere will be the main themes addressed in this chapter.

The ecologically problematic nature of the current emphasis on students learning from their own experiences (and using their own experience as the primary reference point for evaluating what knowledge and which values will have authority in their lives) will be addressed in chapter 6. The current emphasis on the educational value of the student's own experience has its roots in such diverse thinkers as Locke, Rousseau, and Dewey. It was given further legitimation by the progressive education movement in the early twenties and thirties, and by the more recent open classroom of the six-

ties. The argument of liberal educational thinkers that the student's immediate experience provides the form of learning necessary to a more democratic society has appealed to many public schools teachers, with the result that the student's direct experience is now taken to be one of the most significant bases for judging the educational value of the curriculum and teaching style. Indeed, this exalting of the student's experience is now part of the conventional wisdom that prevails in most teacher education programs. Even the curricular changes resulting from recent advances in computer technology reinforce this cultural emphasis on the efficacy of the student's own power of judgment and interpretation, and ability to validate what knowledge is relevant (and even how it is to be organized).

As long as the assumptions and values associated with modernity are the only ones that are taken seriously it will be difficult to challenge the wisdom of this position. The march of social progress seemingly advanced by each new technological innovation has the effect of relativizing all traditional forms of knowledge, thus leaving individuals with the sense that everything beyond their own experience is in flux and thus highly expendable. But one of the problems with the ideology that contributed to the development of modern consciousness, and to the progressive forms of education that both reflect and reinforce the nihilistic characteristics of modernism, is that it is pridefully anthropocentric. That is, the emphasis is on the experience of the individual. But the impact on the environment of this narcissistic orientation was not part of the metaphorical constructions that influenced the development of this modern, progressive form of consciousness. Today, professors of education and classroom teachers continue to ignore the possibility that the ecological crisis might have profound implications for rethinking core liberal assumptions that make the student's direct experience the epicenter of the learning process. Teaching students about recycling, the dangers of polluting the environment, and the characteristics of such natural systems as wetlands and primal forests are not seen as being in conflict with also reinforcing the modern view on the primacy of the student's own subjective experience.

One of the challenges of this chapter will be to expand the discussion of educational/cultural issues by bringing back into focus a characteristic of premodern societies obscured by the relatively recent emphasis on the individual as the basic social unit. For many conservative thinkers this essential characteristic has to do with possessing a more complex and respectful way of understanding tradition. But I would like to frame the discussion of cultural continuity

in a way that takes account of the ultimate test facing all cultures; namely, the ability to live in relative balance with the ecosystems they are dependent upon. That is, no culture that has met the challenge of long-term sustainability carried on its primary educational processes by instilling in its young a bias against the knowledge of the older generation. Long-term survival cultures still existing in parts of the world not overwhelmed by the centralized power of the state and the other trappings of modernization appear to entrust their younger members at an earlier age with greater responsibility for carrying out tasks essential to the group than we see in modern cultures. They also place more importance on trans-generational communication. The ceremonies, beliefs, values, technologies, mythopoetic narratives essential to living in balance with the habitat are passed on from one generation to the next. It is not left to the chance occurrence that young learners might happen to discover in their own direct experience a technological practice that corresponds to some part of the stock of technological knowledge that has evolved over centuries in response to the characteristics of the local ecosystems, or some other form of knowledge or way of understanding and valuing relationships that may already be part of the accumulated knowledge of the group.

Perhaps the more fundamental issue that needs to be part of future educational discussions is whether a highly experimental culture, one that follows Paulo Freire's advice that each generation should continually rename the world, is better prepared to meet the challenge of adjusting and, when necessary, even radically reconstituting cultural practices in ways that take account of the increasingly rapid changes in the Earth's ecosystems, and to limiting the impact of adverse cultural practices in ways that allow for the recovery of natural systems—which would be an even more desirable development. Whether most modern adults have any special knowledge about how to live in ecological balance is problematic indeed. That the answer might possibly be largely a negative one does not lessen the importance of considering the need for a radical shift in attitude toward trans-generational communication, and the role that elders should play in the vital processes of cultural storage and renewal. With the nascent awareness among the current school age population that we have to change cultural directions, there is always the possibility that they will help to discover, recover, and renew knowledge and practices that are less wasteful and injurious to the environment. It would be desirable that this new generation's contribution to understanding how to live in ecological balance is

not lost because of their own children's ideologically driven need to discover their own knowledge and values.

The current privileging of modern forms of knowledge upon which both a highly mobile population and the new technology depend create divisions that are far more complex and critical to the problem of living within the limits of the environment than the old Marxist notion of social class, which critical educators have focused on over the last several decades. Future discussions of how school and university curricula privilege some cultural groups over others need to be framed in terms of the cultural traditions essential to the self-identity and everyday practices of the different cultural groups that make up American society. The current emphasis on how school curricula and approaches to teaching and learning take account of the cultural diversity represented in the classroom is moving the discussion in this direction. But the really critical issue, the one that brings the hubris of the dominant Western cultural/educational traditions more clearly into view, has to do with the possibility that the wide range of folk knowledge of minority cultural groups may serve as models of survival-oriented communities where the emphasis was not on consumerism and acquiring power through the acquisition of the latest technology.

How the folk traditions of minority cultural groups, including rural descendants of European cultures, may represent a granary of hitherto unrecognized practices that do not impact adversely on the environment, as well as how these traditions are part of the trans-generational communication process essential to maintaining a cultural sense of identity, will also be addressed in this chapter. This area of the ecologically-oriented discussion that we must undertake is potentially open to a variety of misinterpretations that could help set us back in terms of recent advances society has made in providing (at least in terms of the legal infrastructure) for more equal opportunity for minority cultures. Three fundamental points will need to be kept clearly in view: first, any discussion of the folk traditions of minority cultures must be based on the recognition that the consumer-oriented middle class needs to undergo a radical change in the direction of becoming less materialistically oriented; second, that the folk traditions of minority cultures are not being singled out for the purpose of creating further obstacles to their full participation in the social, political, and economic life of the larger society; and third, the primary challenge is beginning the task of recovering, renewing, and sharing community traditions that can become part of an ecologically sustainable heritage for the entire society. But first,

there is the challenge of finding our way back to the main pathway of human history where there has been a taken-for-granted attitude toward valuing the complex stock of knowledge (including song, dance, story telling, community-centered games, technologies, sharing of knowledge of place, etc.) of the older generation. The dangers of this discussion fostering the kind of romanticism that educators seem especially vulnerable to, or the knee-jerk criticism that this discussion is part of an unrealistic political effort to return to the harmony of an Arcadia that never was, must both be met by keeping the fundamental issue in focus: namely, *that the upward growth curve that characterizes consumer habits and forms of technological development in modern cultures cannot be reconciled with the downward curve in the viability of natural systems*. The purpose of considering whether trans-generational communication is an essential characteristic of ecologically sustainable cultures, even ones based on modernistic assumptions, is to contribute to a more sane alignment of these trendlines

Some sense of optimism is essential to writing. Even for Franz Kafka, optimism had to outweigh his deep sense of pessimism and futility, otherwise his manuscripts would not have seen the light of day. When it comes to the daunting challenge of affecting fundamental reform in teacher education, which will be part of the focus of chapter 7, optimism is even more difficult to sustain. My own efforts over nearly twenty years to get colleagues at a major university in the Northwest to shift from a behaviorist/technocratic way of thinking about teacher education to a more cultural and linguistic approach proved absolutely fruitless. The suggestion that culture should be made a more central aspect of understanding communication/learning processes and the appropriateness of curricular content to social and environmental problems we face was met with the kind of blank stare and incomprehension that usually accompany the encounter with someone who speaks a foreign language. Indeed, the prevailing mental ecology in the department, where the schemata of understanding acquired years earlier in graduate schools simply represented the next stage in a succession of encoding and reproduction processes that tied my colleagues together with the mental ecology of their mentors who had received their own education in the thirties, seemed dependent upon metaphorical constructions that could not take account of the possibility that the ecological crisis might have profound implications for the education of teachers. As I witnessed the wheel of theory never quite touch the ground of reality during these years, certain important patterns emerged that have

particular relevance to this discussion. Perhaps the most important and recurring pattern had to do with the top-down nature of how change was introduced into the education of teachers. My repeated attempts to initiate a sustained discussion of the conceptual underpinnings of our approach to teacher education was treated as an interruption of the ongoing efforts to fit new techniques and other mandates from the state and federal bureaucracy into the existing teacher education program. I suspect that my experience was not unique.

Although I am not quite willing to give up entirely on the possibility that faculty in teacher and graduate education programs will have a sustained discussion of the educational and cultural implications of the ecological crisis, I am now inclined to see fundamental reform actually occurring in a different way. The indifference of educators, from the first grade teacher to the professor teaching a graduate class, toward cultural expectations that are putting humanity on a collision course with each other over increasingly scarce environmental resources is similar to the educational establishment's record on gender discrimination. Educators did not take seriously the many ways in which they reinforced cultural patterns that were based on assumptions about differential rights and abilities. After these biases became widely recognized in the larger society, educators then became aware of gender discrimination in the curriculum.

Perhaps this pattern will be repeated as environmentalists, Deep Ecology supporters, and others concerned about the consequences of environmental degradation (rising incidence of cancers and other diseases, economic dislocations, loss of biological and cultural diversity, etc.) convince the larger public that their own futures are being increasingly put at risk. But these groups will also need to awaken to the central role that schooling plays in reinforcing in the next generation the pre-ecological form of consciousness that is now contributing to deepening the crisis the Union of Concerned Scientists and others are warning us about. Feminists did not focus on the reactionary nature of schooling until the latter stages of their reform movement. We are witnessing the same pattern in the environmental/Deep Ecology Movement.

If one overlooks the small scale of the ecologically-oriented educational reform efforts occurring outside the educational mainstream, it then becomes possible to see a basis for optimism. But it must be kept in mind that the scale of these reform efforts is analogous to the emergence of a few seedlings in a vast clearcut and devas-

tated landscape. Of the many small scale efforts to find ecologically responsive approaches to education, I have chosen three for discussion here: the Foxfire, Common Roots, and Ecoliteracy programs. Although the Foxfire approach to curriculum is based on a theoretical framework that does not recognize that culture patterns now need to be understood in terms of their impact on natural systems, it is included because of its potential for incorporating this perspective in both rural and urban classrooms. The other two reform efforts—the Common Roots curriculum being developed in rural Vermont and the Ecoliteracy Project being introduced into the San Francisco Bay Area—are based on a clear understanding of how the entire curriculum can be organized around themes relating to the interconnection of community and environmental renewal.

This chapter will be used to consider the strength and weaknesses of these three radical reform efforts. Differences in guiding conceptual principles, which lead to distinctive approaches to curriculum and community involvement, serve as an important reminder that there is no one best approach to an ecologically responsive form of education. Perhaps more important is that while each approach is based on different guiding principles, they all represent a clear break from key assumptions upon which modern consciousness is based. For example, students in a Foxfire classroom address the problem of community renewal by making trans-generational communication a central part of the learning process. The Common Roots schools integrate community and environmental renewal by centering the learning process around the themes of food, community, and ecology. And the Ecoliteracy project uses the principles of ecology as the basis of school governance and the study of the student's social world.

It is also significant that all three approaches to educational reform share nearly identical weaknesses. The two principle weaknesses include a lack of understanding how the languages of culture encode and reproduce at a taken for granted level pre-ecological patterns of understanding, and how technology (such as the computer) reinforces the more ecologically problematic aspects of modern culture. As the languages of a culture and technology are so central to human existence these limitations are not just marginally significant. That these weaknesses have not been taken into account by the theorists chiefly responsible for Foxfire, Common Roots, and Ecoliteracy programs may be due to the fact that a deep understanding of culture, and of the culturally-mediating characteristics of technology, have not been considered as relevant to the advancement of the

modernization process. A second reason these limitations have not been addressed is that the teachers who are reeducated to make curricular and pedagogical decisions consistent with the principles that guide each approach to the classroom are graduates of university education programs. These programs failed to introduce them to how classroom decisions, and the different forms of learning, are embedded in cultural/language patterns. The graduates of these programs, even when educated to think in terms of ecological principles, simply reproduce the silences in their earlier professional experience.

The Foxfire, Common Roots, and Ecoliteracy programs thus serve both as a source of optimism and as a reminder that mainstream teacher/graduate education continues to undermine the kinds of educational reform that are most needed. It is hoped that the discussion of these three educational approaches to community and environmental renewal will make more visible the leverage points for introducing radical changes into more mainstream approaches to schooling. The diversity of these three approaches may also serve to demonstrate that nonindividually centered approaches to moral education, creativity, and intelligence are essential aspects of an ecologically responsible approach to education.

Educational changes that reflected the evolving national consensus on gender and racial issues, as encoded into federal and state laws, were not painless; nor did the changes occur evenly. The challenge of transforming our culture in ways that meet the ultimate test of long-term sustainability, while also expanding on the gains made in the area of civil rights, will involve far deeper changes in taken-for-granted assumptions. It is thus critically important to have a clear sense of the areas of taken-for-granted culture where gains can be achieved, as well as those aspects of the old way of representing the culture/language/thought/behavior connection that now serve as a keystone for holding together other parts of the conceptual edifice upon which formal education now rests.

Hopefully, these chapters will help identify the issues that should be part of the discussion of how to transform the pre-ecological form of consciousness that still characterizes our approach to education, and will not become simply another instance of thwarted communication.