Attending to Interconnection
Living the Lesson

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How does one see a painting whole? Or the human mind? Or an ecosystem? Or for that matter, the educational project itself? We are well schooled in "seeing them" into parts—into brushstrokes, neurons, and molecules—or seeing the university apart into departments, disciplines, and specializations. What kind of attentiveness will enable us to see a true whole? What is the pedagogy for beholding interconnectedness as a primary reality and not a derived one? What are the implications of a deep experience of interconnection for knowing, teaching, learning, and life? What would be gained if, as the Dalai Lama says, we were to cultivate "a deep sense of caring for others, based on a profound sense of interconnection?"[1] It is perhaps difficult to appreciate how extensive the changes would be if this integrative viewpoint were fully embraced in higher education. The conventional view that privileges a single reductive perspective is so pervasive that undoing its effects will be difficult, but if we were to succeed, then the fragmentation of our education and our lives would be healed. Simultaneous with our experience of self would be the powerful complementary experience of human interdependence, of what Desmond Tutu calls *ubuntu*: "I exist because of you."

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Emerging Wholes

Since Galileo, science has had a bias towards simplification for the very sensible and practical reason that it was all it could handle. Nothing is wrong with this as long as the limitation of the method is not projected onto reality, limiting it. If all you have is a thermometer, then everything is a temperature. But we now know that analysis of climate, the human nervous system, economics, and ant colonies, to mention only four examples, resists such simplification. To understand them with any subtlety requires that we embrace their inherent complexity and work with it. Until the last few decades, the exclusive method of studying complex systems was to break them down into fundamental parts and then to connect neighboring parts by means of simple forces. The forces between these distinct parts bind them into wholes. The whole is a mere amalgam of conjoined parts that has no ontological standing of its own. The solar system, in this view, comprises a star (the Sun), planets, asteroids, comets, and the like, all held together by the force of gravity acting between them. The atom likewise consists of a nucleus and surrounding electrons bound together by an electromagnetic force. This lens is then extended to chemistry, biology, and the human being. The parts are considered to be "real," as are the forces that make connections between the parts, but the whole—be it a mineral substance, plant, animal, or human—is a kind of chimera. While such a view is useful in many instances, we now know it to be fundamentally mistaken. Two scientific developments—entanglement and emergence (as well as common sense)—have made this conception of the world obsolete.

The first breakthrough came when physicists were able to attend to two things at once. This may sound simple, but to simultaneously measure the subtle properties of two or more quantum particles required a significant increase in resources and experimental sophistication. The simplest experiment of this type was first suggested in 1935 by Einstein, Rosen, and Podolsky,[2] but it had to wait until the 1980s for a definitive test.

Light not only has the properties of intensity and color, but it can also have an internal orientation. If thought of as a wave, then the vibration can be up and down or side to side. These two different orientations of vibration are called polarizations. When physicists measured the correlations between the polarizations of photon pairs, the patterns in the data could not be explained by any classical conception of light. (The quantity measured is a complex correlation function for the probability of simultaneously detecting two photons at a particular polarization angle relative to one another.) The results were astounding, not because they required a new physical theory (quantum theory was adequate to the task), but because of their ontological implications. Here was a potent metaphysical experiment, and it demonstrated convincingly that the understanding we had of wholes as merely parts juxtaposed and bound together by forces was wrong. In a crucial manner, when two particles interact, they form an inseparable whole and the very attributes by which we would normally distinguish the one from the other become, as physicists term it, "entangled."[3] The two particles form a whole that is as real as the parts. Parts are no longer privileged.

I think it symbolic that wholes showed themselves only when physicists learned to attend to two things at once. The old practice of attending first to one thing (planet or particle) and then to another fragmented the world into parts. We were unconsciously practicing a particular kind of attention. The universe was and is a whole, but the method by which we chose to observe the universe fragmented it, and we mistakenly assumed our method gave us a true reflection of reality. In the process of learning how to attend to the whole, we learned that the experimental context and our kind of attention are highly significant: They cannot be excluded as inconsequential. As we have seen already, our method of inquiry shapes, in part, only in the phenomena themselves, and it is these phenomena to which we have access. If we attend to separate parts, that is what we see. If we are interested in wholes and devise an experimental method suited to that interest, then wholes show themselves. This is no mere relativism or pure constructivism, but rather an example of the world's richness that reveals itself in stages in response to us and our properly posed questions.

Scientists now recognize that the qualities that emerge in complex systems are often not able to be reduced to the parts that make up the system. Hydrogen and oxygen are the elemental gases that make up water, but the "wetness" of water is an "emergent property" of the system not reducible to hydrogen and oxygen.

The best known physics example of the relationship between question and phenomenon is wave-particle duality. If the question we pose is, "Where is the photon?" then light shows itself as a particle. If, however, we do not ask, "Where?" but allow for an ambiguous trajectory for light, then the resulting observed interference pattern can best be understood in terms of light as a wave. These contradictory manifestations of light—first particle and then wave—arise in response to the experimental arrangement, which itself is the embodiment of a question. Classically considered, wave and particle are mutually exclusive concepts, but in quantum mechanics each aspect arises within

a distinct measurement context and so it is entirely appropriate to that specific context. Context trumps consistency. The context in which we examine light fundamentally shapes the phenomenal manifestation, as well as our conception of light in that context.

The second scientific development that supports the overthrow of reductionism is emergence. If we turn in our imagination to walk along a lively forest stream, or if we listen to a Mozart aria we know well, it seems clear that our life is not made up of atoms and neurons but of a dense, rich array of meaningful experiences. What is the relation between the parts so often at the center of the scientists' attention and the experience of wholes that occupy the rest of us? While the fact of quantum entanglement is a principled block to reductionism, a second scientific realization grants added weight to the status of wholes. Briefly put, scientists now recognize that the qualities that emerge in complex systems are often not able to be reduced to the parts that make up the system. Hydrogen and oxygen are the elemental gases that make up water, but the "wetness" of water is an "emergent property" of the system not reducible to hydrogen and oxygen.

In a seminal paper aptly titled "More Is Different," the Nobel physicist Philip Anderson stated, "At each level entirely new properties appear. …Psychology is not applied biology, nor is biology applied chemistry. …We can now see that the whole becomes not merely more, but very different from the sum of its parts."[4] Nobel physicist Robert Laughlin put it another way: "We live not at the end of discovery but at the end of Reductionism, a time in which the false ideology of human mastery of all things through microscopics is being swept away by events and reason."[5] Reductionism is, indeed, a false ideology. While we surely learn a great deal by attending to microscopic parts, we must be careful not to fall in love with the myopic view that mode of analysis offers. We must complement it with an equal attention to relationships and wholes. Only then will we truly behold the painting, appreciate the mind, and understand the complex reality that is the ecosystem. Only then can we arrive at a pedagogy that sees students as whole and complex beings and educates students with an eye to this reality.

In summary, I have used science to expand our worldview beyond a reductive materialist ontology in two ways.[6] First, Einstein's relativity and quantum mechanics both undermine objectification and support a relational view of reality in which phenomena are co-created by the observer and the world. Second, through entanglement and emergence, physics offers evidence for an ontological holism that grants wholes a standing long denied them. Parts are no longer privileged. These two realizations are essential to a proper philosophical infrastructure for higher education.

Pedagogies of Experience and Interconnection

Nearly every subject area in the academy has attempted to make itself over into a "science" by adopting its own version of the worldview and methods of the old physics of objectification and disconnection. Along the way, the education of the whole human being in community and the cultivation of his or her humanity seem to be increasingly forgotten for the sake of scientific simplification. If we take Laughlin and others seriously, then these fields need to reconceive themselves according to a postreductionist paradigm in which lived experience, connection, and complexity are given far more attention. Every field will also benefit from adopting ways of teaching and learning that are in closer alignment with the relational and integrative view of reality we now possess. In this regard, consider economics, health care, and medical education.

Economics has long objectified the human being, reduced to an idealized *homo economicus*, a hypothetical rational actor who maximizes his or her utility function (which mathematically represents the preferences of the consumer). In

addition, our relationships to fellow members of our community are reduced to the limited concept of the market. With these two abstractions of the human being and communal relations, economics performs its analysis. While a useful formal model, classical economic theory of this kind has come in for heavy criticism and much modification. As in physics, the simplifying assumptions of classical economics were made because economic theory could not handle the complexities of the real world. But are humans really rational economic actors? Economics experiments show we are not. Understanding this opens us to other important questions to consider, such as, Is market behavior the only or best way to gauge preferences, or might we allow for thoughtful, patient introspection concerning the root causes of suffering and happiness? Does the market really offer an accurate and comprehensive valuation of community, or might we allow for forms of fellowship that elude economic objectification?

In economics as in other fields, the limitations of its methods are projected onto reality, truncating our image of self and community in ways that ultimately are not only wrong but pernicious. Real people and their lives disappear behind the equations, and the densely interconnected world in which we live is replaced by a more tractable limited system of competing individuals and corporations that produce and consume. Objectification and impersonal economic transactions come to not only dominate our models but also infect our views of each other and the natural world.

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The failure of traditional economics to account for what are called "externalities" is a symptom of its tragic neglect of the interconnectedness we have been considering. For example, the additional health and environmental costs caused by the pollution associated with production are "externalized," which is to say they are not borne by manufacturers but by the populace and the environment. Impacts on the environment and community are obvious if one has a worldview that acknowledges the dense interconnections between human activity, environment, and health. Instead, classical economics neglects them. "Ecological economics" or "natural capitalism" is an emerging alternative to classical economics that explicitly rejects the way in which neoclassical theory treats externalities.[7]

The critique goes deeper. In his book *The Dismal Science*, Harvard professor of economics Stephen Marglin characterizes economics as "hobbled by an ideology in which these tensions [between individual and whole, between self-interest and obligation to others, between material and spiritual health] are replaced by a set of pseudo-universals about human nature."[8] Doing so simplifies the modeling but at great cost. Marglin goes on to provide a foundational critique that reaches beyond the inclusion of externalities to the very ways in which community—necessary to a good life—is systematically undermined by markets that replace personal ties with impersonal market transactions. He shows that the effects of this process on well-being and the quality of life are large and negative.

Further problems arise in economics because of its impoverished view of the human being. Two examples will help make clear what I mean. The first is the Ultimatum Game, which economic researchers are now using to explore the limits of the basic assumptions of neoclassical economics, those assumptions being that *homo economicus* always acts rationally and in his or her own self-interest.[9] In this model, emotions, altruism, fairness, community, and so on have no real place in the economic calculations. In

the Ultimatum Game I receive a day's wages from someone with the condition that I give you some portion of what I received. If you keep the portion I give you, then the division of money between us is settled. If you do not keep the portion given, then both of us forfeit the money. According to standard economic calculations, since something is always better than nothing, you will keep whatever amount I give you, otherwise you (and I) lose the money. Taking whatever is given is the rational, self-interested thing to do. Experiments show, however, that in all cultures if the amount given is below about 25 percent, you will refuse the offer. Irrational factors or violations of self-interest are at play.[10] Why are we not surprised by the result? Because we too would reject a demeaning offer, no matter what the economists say.

The second recognized failure of neo-economic theory is the "tragedy of the commons." Our survival as a species depends fundamentally on such common resources as air that is suitable to breathe, water that can be drunk, fish in the sea, soil that will grow crops, and so on. But if fishermen, farmers, and other workers act rationally and purely in their self-interest, then the neoclassical economic calculation predicts the collapse of fish stocks, the disappearance of water, and so on. Without someone acting on behalf of everyone, without a selfless sense for the whole, the tragedy of the commons will take place. But societies do step back and regulate fishing, water rights, and air quality on behalf of the community and future generations. Such acts as these are not part of the traditional economic calculus. The significance of this failure was recently underscored by the Nobel Prize committee when they awarded the 2009 Nobel Prize in Economics to Elinor Ostrom for her work on the tragedy of the commons.

With these and other groundbreaking economic studies in behavioral economics, wellness studies, and game theory, we are beginning to see the incursion of a more phenomenological and nonreductive approach to the understanding of people's economic life. Through these approaches the actual economic behavior of human beings is studied instead of presumed or idealized behavior. These are complemented by psychological and neuroscientific studies, which are also opening new ways of thinking about economics.

Enlarging our view of the human being and enriching our relations to the world we inhabit will change not only the content of our courses but our pedagogy as well. Three examples can stand for many. At the University of Southern Maine, professor of economics Vaishali Mamgain offers a course on neoclassical economics and happiness in which she not only reviews research on this topic but asks her students to work reflectively with questions such as these:

- What are the causes and conditions that make you happy?
- Who is it that is experiencing happiness?
- Are happiness and pleasure the same thing?

Political philosopher David Kahane at the University of Alberta draws his students into the deep moral issues around allocation of resources by asking students to examine their own choices. With great sensitivity, he then invites them to view in a sustained way the image of an African mother burying her child who has died from an entirely preventable illness. Kahane notes that the cost of a latté is equal to rehydration therapy for five children. Both Mamgain and Kahane seek to join textbook material with the experiences and inner observations of their students. Students are explicitly asked to bring themselves into the material and to offer thoughtful comments based on introspection.

Frank Maddox is an award-winning economics professor at Oxford College of Emory University who teaches in a similar way. He uses a variety of strategies to make vivid the realities of poverty and wealth, industrial and craft production, and consumption. For instance, after his students have studied standard economic theory in which consumers are modeled as maximizing utility, he

gives them an unusual assignment. They are asked to go to a store like Wal-Mart® or McDonald's® and note the expressions, actions, and so on of the people there. Students are to observe, without judgment, anything that will help them gauge the degree of consciousness shoppers give to what they are doing. Then Maddox asks the students to observe themselves in the same way, again without judgment. How attentive are they to what they are doing at any moment? What would it mean for us if we were more aware of our consumption? He calls it mindful consumption, and he asks what it might mean to replace maximizing utility with mindful consumption. At the end of the semester Maddox's economics students all present their Interbeing Projects. Interbeing is a term taken from the Buddhist teacher Thich Nhat Hanh that emphasizes the interconnectedness of all things. Students select a consumer good or service and then research some aspect of its production, becoming more conscious of their connections and responsibilities to it. Maddox teaches economics not only with interconnectedness in mind but as an experience for his students.

In the same vein, author Daniel Goleman in his book *Ecological Intelligence* makes a compelling case for the huge environmental and social benefits that would occur if we practiced mindful consumption, especially when the technologies become available to support us in this practice at the point of purchase.[11] For example, in an early version of such a technology, the foundation Nature & More rates hundreds of products and profiles producers and their social and environmental practices, all available on its website.

As the second example of the benefits of the relational and integrative view of reality, consider health care and medical education. In the United States, our approach to medicine has increasingly become a reductive science married to a for-profit economic model that is fast approaching collapse. The questions of the quality of care for the whole person and the education of the whole physician seldom rise to the top of the agenda. Instead, cost analyses and technique pervade the system and threaten to overwhelm the idealistic motives that draw most medical and nursing students to the profession. At every step, caring for those who are ill and suffering is made increasingly difficult by a system at odds with itself. I hardly need describe the dangers of a truncated biomedical model that sees the human being purely as a collection of organs, blood levels, and test results. Good medical education and health care do not require such a view; in fact, it seems obvious that a fully integrative view is called for.

For several years I taught an interdisciplinary course that studied, among other topics, the human body in art and science. We worked equally with the anatomical drawings of Leonardo da Vinci and the scientific study of the heart by Andreas Vesalius and William Harvey. The capstone experience was a trip to the anatomy lab of the University of Massachusetts Medical School in Worcester, which was run by the remarkable teacher and anatomist Sandy Marks. When Marks first began teaching, anatomy classes had historically been taught as a grisly, even macabre, boot-camp experience. Early on he noted that some of his best students were dropping out of medical school as a result. His own sensibilities, as well as conversations with students in his class, led him to a total overhaul of the gross anatomy class.

Now the first day of class begins with readings and conversations about death. For many students the cadaver they will dissect is their first direct encounter with mortality. It often raises fears and memories of those they have lost. Marks makes time and space for these recollections and feelings. He then introduces the students to their "first patient." No longer taken from the state's unclaimed dead, each body has been donated to the medical school, some coming with personal letters or poems expressing the wishes of the deceased. He read one to us: "May that life force that ran in me shine forth once more and pass to you the knowledge and the power that help sustain the miracle of life."[12] In this class, each medical student takes the body apart layer by layer, learning its

miracles, but now it is done with respect and ever mindful of the gift. At the conclusion of the class, relatives of the deceased are invited to a closing ceremony in the medical school courtyard at which the students express in words, music, and poetry their deep gratitude for the gift of the body they studied.

Sandy Marks passed away in 2002. The last group of students he taught composed and read this poem at his memorial service:[13]

> I sat in tears and you told me about dying.
> I watched in horror as you took the death from another's body.
> I lost myself on my way to your office, but when I got there, you had found me.
> Knowledge, you offered us. Humor, you provided for us. Humanity, you required of us.
> Stability, you granted us.
> Instant, unwavering stability.
> We watched, listened, spoke, heard, laughed, feared, cried, refused, overcame, denied, and responded.
> And with a wink and a nudge of your elbow, you calmed the eruption of emotional chaos. We learned. And with a wink and a nudge of your elbow, you made it clear why.
>
> – Nicole LeBoeuf, UMMS Class of 2006

Our day at the anatomy lab recapitulated in miniature the medical school experience, from the meeting with death and dissection to the conversations about loss and love. It was an amazing and moving experience for our Amherst College students, one they never forgot. They experienced a profoundly ethical form of education in which knowing and caring were united.

In pedagogies of experience and interconnections, we are often challenged by the worldview and values of those we meet. Those we meet can think, feel, and act so differently than we do. Such experiences awaken us to our own culture, mores, and behavior, and this is especially so when our engagement with other communities is in service to them. In response to a request from us, Alma Blount describes an educational program that connects communities and the classroom in important ways. Working with people who hold conflicting values in a democratic society brings the realities of leadership and politics to life. Service Opportunities in Leadership (SOL), sponsored by the Hart Leadership Program in the Terry Sanford Institute of Public Policy at Duke University, is an intensive yearlong program for undergraduates that combines academic study, service to communities, and critical reflection. In writing about the program, Blount asks her students rhetorically,

> What are the highest goals of this class? Informed by scholarship and the ideas of your classmates, you will arm yourself emotionally and intellectually to enter a new culture prepared to serve and to reflect critically on your experience there. We will ask you to think deeply about how to approach the inevitable value conflicts you will face as you cross the borders of new organizations and cultures. We will ask you to examine your own religious and cultural values and preconceptions. We will challenge you to explore how you can, over time, become a fully engaged citizen of your own society.

Alma Blount's effort is another example of how we can deepen learning in the classroom through experiences beyond its walls.

The solitude of specialization often reflects a wider disconnection from others. Classroom culture reinforces that disconnection, not only between teacher and student but also between students

Interdisciplinarity and Intentional Teaching

We can choose the way we teach. The teachers profiled in this chapter have each sought ways to give body and soul to the otherwise abstract concepts and depersonalized practices of their discipline. They have sought ways of inviting students to make use of their own experiences by pausing to quietly question, reflect, feel, and write. As the students go on to become engaged citizens, doctors, economists, and even consumers, that habit of pausing, reflecting, honoring, and acting morally will serve them and our society.

Sandy Marks and his students reformed their anatomy lesson, making the laboratory at once an educational and a sacred space that welcomed all of who they were: body, mind, and spirit. Might we not do likewise? When we do, the ripples are likely to go far beyond our individual classrooms. Is it any accident that Jon Kabat-Zinn began his revolutionary work in mindfulness-based stress reduction down the hall from Sandy Marks? Every bold integrative initiative in higher education will find its echo because we are in the company of others who will respond in their own unique way to our honest efforts at cultivating humanity.

> At first, love seems to have little to do with knowledge and our understanding of how it works, but if we set aside romantic love for the moment, is it not true that we come to know best that which we love most?

In recent decades another way of striving to innovate in higher education has been through efforts at interdisciplinary teaching and research. Those involved have sought to bring disparate areas of learning together to illuminate each other, and much has been gained in the process. I have relished the many interdisciplinary courses I have taught over thirty years with colleagues from across the campus: Romanticism and the Enlightenment, The Imagined Landscape, Eros and Insight, to name a few. These courses brought me together with brilliant scholar-teachers from whom I learned and was enriched. In such classes students saw firsthand the ways in which every issue begs to be addressed from multiple directions. Few issues are adequately treated from a single disciplinary perspective, and the lively engagement of two or more colleagues who tackle an issue, text, or historical period demonstrates this truism again and again.

While interdisciplinary teaching brings much to learning, it is not by itself necessarily truly integrative. Most often it is a case of simple juxtaposition. The scholars each bring their expertise and place their contribution beside that of their colleagues. The students are left with the difficult task of synthesizing the parts into a whole on their own. For these classes to be truly integrative, faculty need to exemplify integrative understanding through the ways in which they connect diverse fields into a comprehensive integrated whole.

For example, Princeton psychologist Daniel Kahneman was awarded the 2002 Nobel Prize in Economics for his development of prospect theory, which concerns decision making in the face of risk. Kahneman made a seminal contribution to economic theory without ever taking a single course in the field of economics. He and his colleagues worked across disciplinary boundaries, bringing psychology and economics into a profoundly fruitful integration. Harvard Nobel economist Amartya Sen has reached out the other way to include a very wide range of non-economic factors into his economic analysis, including individual and societal values, human development, and the rights of individuals. Originality does not respect disciplinary divisions.

Each semester students take courses across the curriculum, especially if they are in liberal arts colleges, that support a broadbased education. They should be encouraged to bring all of who

they are and what they know into each class. When in a literature class studying, for example, Keats's conception of "negative capability" ("when man is capable of being in uncertainties, mysteries, doubts without any irritable reaching after fact & reason"[14]), students might well draw on understandings and experiences of this capacity from areas as diverse as psychology, religious studies, quantum logic, and Goedel's incompleteness theorem. Poets are not the only ones who deal in uncertainties, mysteries, and doubts. With this simple realignment, we shift our focus from the technical understanding of a literary reference to students' whole learning; we thereby become interested in students in their entirety not merely as budding literary scholars. Cross-disciplinary initiatives are needed if we are to prepare our students to meet the real problems our society faces. No one field has all the answers because real issues possess multiple dimensions.

By welcoming the whole student into our classes, unfamiliar aspects of who they are and what they care about suddenly come into view. What are the heartfelt questions they struggle with? Are they too scared to acknowledge the hopes and aspirations they harbor for their lives and for this world? If they fail to voice them in the safety of a college classroom, will they ever dare to live their aspirations later? And what if we would reciprocate by revealing unfamiliar aspects of ourselves? Too often we hide in our specializations when, in fact, our interests, experiences, hopes, and understandings are far broader than we let on. In brief, we should do far more to support both students and faculty who strive to combine depth of knowledge in a special area with breadth and integration. Working with such contradictory intellectual gestures may well be the hallmark of great innovation, and our pedagogies should strive to foster the capacity to sustain and use contradictions to their fullest.

The solitude of specialization often reflects a wider disconnection from others. Classroom culture reinforces that disconnection, not only between teacher and student but also between students. Patricia Owen-Smith wondered why "life in the academy has been consistently alienating and lonely" for her. Gradually she came "to understand that the academic world of higher education has been structured in such a way so as to normalize and promote alienation. Under the guise of academic freedom and professional autonomy, we close our classroom and office doors physically and metaphorically." Upon realizing this, Owen-Smith set about changing the culture of her classroom. In her case, she introduced a period of listening to music at the start of each class, with the encouragement to be still and to "go within." She felt awkward at first, but slowly the students warmed to the innovation, bringing in their own music and appreciating the time of stillness and the journey within. In her description for us, Owen-Smith writes:

> As we neared the end of the semester the structure of the class had changed from a group of individuals reluctantly gathered together for study to a community of friends and partners who were creating a space of introspection, quiet, and respect for the process of study and the development of self. …It has been a decade since this initial introduction of contemplative music and I cannot envision a classroom without music. Semester after semester, I watch with delight as we take a journey together, a journey whereby we hear our souls, breathe in silence, cherish stillness, and learn from one another in the most enduring ways. Our journey is a dance, a conversation, a celebration of the heart, and a sacred moment in the process we call "education."

With each additional view of a landscape, we enrich our appreciation of its character and beauty. With each added intimacy, we come to know a person better and more fully. No one view contains the whole truth, but by moving among and between

a myriad of them we may gain an intimation of a truth which lies forever beyond our grasp. Such is the living work of integrative teaching and learning to which the university in its entirety should be dedicated.

Such synthetic efforts need to be supported within our universities and colleges. Yet if they are truly integrative, they may well be contrary to the traditional departmental structure of the academy, whose power and reluctance to change we should not underestimate. Much would be gained by fostering a university culture that simultaneously values disciplinary specialization and truly integrative research and teaching. That is, while we rightly value the specialized knowledge of each separate discipline, we should give encouragement to scholars who step outside their specialization to integrate novel areas into their research and teaching. To this end, we need to find ways to promote conversations around issues that draw together diverse voices, viewpoints, and competencies. We recognize that starting such conversations requires boldness.

Enriching Epistemology, Fostering Imagination

The wish to comprehend leads us to develop methods of inquiry directed toward reliable knowledge. If the methods we possess are fragmentary or partial, then our knowledge will be likewise. In this way we see that an expanded ontology requires an enriched epistemology. The richness of the world will not reveal itself by a single means of inquiry. Not only are many questions required, but they must be posed and explored in different ways, each one of which illuminates the world from another direction, inner as well as outer.

Let us return to and dwell a little longer on the illusive human capacity of imagination so central to a vital and genuine university. Ralph Waldo Emerson described imagination as profoundly participatory: a knowing by becoming. "Imagination," he wrote, "is a very high sort of seeing, which does not come by study, but by the intellect being where and what it sees."[15] The intellect of the inquiring individual shifts the locus of its activity from itself into the other. Through imagination, the mind finds a way of living for a time beyond itself, becoming "where and what it sees." As Palmer has already mentioned, Evelyn Fox Keller characterized biologist Barbara McClintock's method as "learning by identification" so that the object she was studying (maize) became a subject.[16]

> Expanding our ontology and enriching our epistemologies in the ways I have indicated is, in my view, a requirement for any future philosophy of education that will give us the integrative education our students and our world sorely need.

The epistemology of imagination rejects objectification and distancing and instead practices what we might term subjectification and intimacy. This is McClintock's "intimacy that does not annihilate difference." It is a patient, contemplative method that seeks "to hear what the material has to say to you," and through which one achieves "a feeling for the organism." In an address to young Harvard biology students, McClintock urged them to "take the time and look," but as her biographer Keller rightly commented, today "the pace of research seems to preclude such a contemplative stance." Yet it is precisely this contemplative stance that is essential to an integrative and imaginative education within our contemporary culture of teaching and learning.

For these reasons I view the practice of *contemplative inquiry* as an essential modality of study complementary to the dominant analytic methods now practiced in every field.[17] I see contemplative inquiry as the expression of *an epistemology of love* that is the trueheart of

higher education. *Epistemology* means "theory of knowledge," or how we know what we know. At first, love seems to have little to do with knowledge and our understanding of how it works, but if we set aside romantic love for the moment, is it not true that we come to know best that which we love most? To make this method clearer, I will distinguish seven stages in the epistemology of love.

The first stage is respect. We cannot take the ethical orientation of research for granted. We should consciously adopt a positive ethical orientation toward our object of study. What is the quality and character of our interest in what lies before us? Do we respect the integrity of the other, be it a poem, a plant, or a patient? In his *Letters to a Young Poet*, Rilke suggested that the highest we can offer another is to "stand guard over their solitude.[18] When we truly respect the integrity of the other, we "border and protect" them, Rilke suggested, even while we seek to know them more completely.

The second stage is gentleness. In his own scientific investigations, the poet Goethe, like McClintock, sought to practice what he called a "gentle empiricism [*zarte Empirie*]."[19] If we wish to approach the object of our attention without distorting it, then we must be gentle. By contrast, the empiricism of Francis Bacon spoke of extracting nature's secrets under extreme conditions, of putting her to the rack. An epistemology of love rejects such methods.

The third stage is intimacy. Conventional science distances itself from nature and, to use Erwin Schroedinger's term, *objectifies* nature.[20] Under this view, science disengages itself from phenomena for the sake of objectivity. Contemplative inquiry, by contrast, approaches the phenomenon delicately and respectfully, but it does nonetheless seek to become intimate with that to which it attends. We can still retain clarity and balanced judgment close-up, if we remember to exercise restraint and gentleness. The new science makes clear the implications of such intimacy in its account of observation.

The fourth stage is vulnerability. In order to know, we must open ourselves to the other. In order to move with and be influenced by the other, we must be confident enough to be vulnerable, secure enough to open ourselves to the being and becoming of the unknown. A dominating arrogance will not serve. We must learn to be comfortable with not knowing, with ambiguity and uncertainty. Only from what may appear to be weakness and ignorance can the new arise.

The fifth stage is participation. Gentle and vulnerable intimacy leads to participation in the unfolding phenomenon before us. Outer characteristics invite us to go deeper. We move and feel with the natural phenomenon, text, painting, or person before us, living out of ourselves and into the other. Respectfully and delicately, we join with the other, while maintaining full awareness and clarity of mind. In other words, an epistemology of love is experientially centered in the other, not in ourselves, in Emerson's language "the intellect being where and what it sees." Our usual preoccupations, fears, and cravings work against authentic participation.

The sixth stage is transformation. The last two characteristics, participation and vulnerability, lead to a patterning of ourselves on the other. What was outside us is now internalized. Inwardly we assume the shape, dynamic, and meaning of the contemplated object. We are, in a word, transformed by experience in accord with the object of contemplation. The individual is developed, or we could say is sculpted, through the above practices.

The lineage of education as transformation dates back to at least as far as the Greeks. In his book *What Is Ancient Philosophy?* the French philosopher Pierre Hadot writes that for the

ancient philosopher, "the goal was to develop a *habitus*, or new capacity to judge or criticize, and to transform—that is, to change people's way of living and seeing the world."[21] Simplicius asked, "What place shall the philosopher occupy in the city? That of a sculptor of men." Or as Merleau-Ponty has put it, we need to relearn how to see the world.[22] In an essay on science, Goethe gave voice to a potent pedagogical principle: "Every object well-contemplated opens a new organ of perception in us."[23] Echoing Goethe's view while commenting on McClintock, Evelyn Fox Keller remarks that "a motivated observer develops faculties that a casual spectator may never be aware of."[24] The innate capacities for imaginative cognition that are everyone's common inheritance are animated and developed through the patient practice of an epistemology of love.

The seventh stage is imaginative insight. The ultimate result of contemplative engagement as outlined here is, as Goethe might have called it, organ formation, which leads in turn to imaginative insight born of an intimate participation in the course of things. In Buddhist epistemology this has been called "direct perception"; among the Greeks it was called *episteme* and was contrasted to inferential reasoning. Knowing of this type is experienced as a kind of seeing, beholding, or direct apprehension, rather than as an intellectual reasoning to a logical conclusion.[25] It is the moment of creative insight which every scientist, scholar, and artist recognizes as the axis around which their work turns but which cannot be produced on demand. Simone Weil termed it "grace."[26] In his journal Emerson conjoins artistic and scientific creativity by the illuminating remark, "Never did any science originate, but by a poetic perception."[27]

While insight is the guide of wise action, its accomplishment requires restraint. We must pause to reflect before speaking, quietly engage the issue inwardly before acting, open ourselves to not knowing before certainty arises, and so we live for a time in the question before the answer emerges. Only under such conditions can the imagination work; recall Keats's negative capability. In *East Coker* T. S. Eliot describes the need for open awareness without expectation: "Or when under ether, the mind is conscious but conscious of nothing—/ I said to my soul, be still, and wait without hope." Poetry, indeed all art as well as all science, flows from such restraint.

In a paper written during her first year at Amherst College, Annie Handler struggled to hold the tension between knowing and loving that resolves itself in an epistemology of love. Already at eighteen Annie longed to learn, longed to embrace equally both the sciences and the arts. In her final paper for the first-year seminar "Eros and Insight," she wrote:

> This true nourishment of the mind and body is often mistaken with a false nourishment of material objects; however, when looking at Marguerite Porete's words "love Love and do as you will," it is clear that the true nourishment of life and living is a love of knowledge—knowledge of the arts and sciences. No other nourishment is as capable of sustaining life as these two, for the fusion of knowledge and passion for the arts and sciences ultimately lead to a state of immortality, and as Diotima reveals [in Plato's *Symposium*], reaching a state of immortality is a state for which all humans aspire.

Annie has worked as an intern in the National Institutes of Health for the last four summers doing research on Parkinson's disease and the brain. And yet she refuses to isolate the science she does from the art she loves. In a recent e-mail to me, she wrote, " 'Eros and Insight' has given me the greatest gift any science researcher could ask for—the perspective that allows me to simultaneously see the art in nature and the possibilities for incorporating that art into the research of science."

So, we come full circle. What began in respectful wonder flows back as insightful and harmonious action in the world and human society. Modestly, we recognize that our knowledge is a reflection of our means of inquiry and the context of our question, and we realize that by attentively circling our subject we enrich our understanding. Traditionally distinct disciplines begin to interweave. Confronted by the problems of the environment, we weave together the insights of science, economics, politics, communication, and even the arts. Each contributes to the fullness of our understanding and the pragmatics of action. Expanding our ontology and enriching our epistemologies in the ways I have indicated is, in my view, a requirement for any future philosophy of education that will give us the integrative education our students and our world sorely need.

Awakening Compassion

As Parker Palmer rightly observed, the final crucial stone in the infrastructure of integrative education derives from the principle, "Every epistemology, or way of knowing, as implemented in a pedagogy, or way of teaching and learning, tends to become an ethic, or way of living." We believe that ethical thinking and action are supported by integrative teaching and learning. Compassionate action is fostered in students when they learn not only with the intellect but also with the heart. As I have attempted to show, an epistemology of love bridges the divide between intellect and feelings, between objectivity and participation. Once knowing activates our feelings, we are moved to action. We move from being a bystander to being a neighbor or friend. Our intimate understanding of others and their needs prompts compassionate action.

We find an instance of exactly this in the program initiated by Judy Goodell and Joan Avis from the University of San Francisco. They note that like so many other universities with noble mission statements, "the motto of USF is 'educating hearts and minds to change the world.' " Putting these fine words into action, Goodell, Avis, and their students started an educational initiative in the Mayan town of Tekit in the Yucatán which sought to support the education of Mayan youth through high school. As they describe it,

> The program was designed to meet the educational needs and development of the whole person. We believed from the outset that education of the mind, heart, and spirit must unfold concurrently for meaningful change to occur. Yet even we were amazed at what began to take shape as teachers and learners opened themselves to deep engagement in the circles of each other's lives.

Through their description of the project, one senses the pedagogical power that helping others brings with it. Words like *meaning*, *values*, and *purpose* lose their abstract philosophical ring when we are aiding others. The capacities we have cultivated are finally put to real, ethical use, and we are motivated to learn more and become more human for the sake of others. Such engagement is one of mutual benefit; an ethical action, rightly taken, invites a reciprocal generosity that can appear in unexpected ways. Integrative education embodies the principle of reciprocity. In the words of Goodell and Avis,

> Delivering an integrative educational program in a different culture requires a willingness to participate in community ritual events and story making; it is with curiosity, joy, and gratitude that we have done so. It is part of the rich legacy of our own learning. Integrative participatory education is reciprocal. When one heart, mind, and spirit connects to another, both become teacher and learner, and both are changed.

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Resources

1. Dalai Lama, *Washington Post* (October 21, 2007), p. 81.
2. Albert Einstein, Nathan Rosen, and Boris Podolsky, "Can Quantum-Mechanical Description of Reality Be Considered Complete?" *Physical Review* 47, no. 10 (1935), pp. 777–780.
3. George Greenstein and Arthur Zajonc, *The Quantum Challenge*, 2nd ed. (Salisbury, MA: Jones & Bartlett, 2005).
4. Philip W. Anderson, "More Is Different," *Science* 177 (August 4, 1972), pp. 393–396.
5. Robert Laughlin, *A Different Universe: Reinventing Physics from the Bottom Down* (New York: Basic Books, 2005), p. 221.
6. Arthur Zajonc, *Catching the Light: The Entwined History of Light and Mind* (New York: Oxford University Press, 1993).
7. Paul Hawken, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution* (Boston: Little, Brown, 1999).
8. Stephen Marglin, *The Dismal Science: How Thinking Like an Economist Undermines Community* (Cambridge, MA: Harvard University Press, 2008), p. 263.
9. Joseph Henrich, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, Herbert Gintis, and Richard McElreath, "In Search of *Homo Economicus*: Behavioral Experiments in 15 Small-Scale Societies," *American Economic Review* 91 (2001), pp. 73–78.
10. Henrich et al., "In Search."
11. Daniel Goleman, *Ecological Intelligence* (New York: Random House, 2009).
12. Sandy C. Marks, Jr. DDS, PhD: *Collected Memories from Friends, Students and Colleagues* (University of Massachusetts, n.d.), p. 7, http://www.umassmed.edu/uploadedfiles/marksbook.pdf.
13. Sandy C. Marks, Jr., p. 15.
14. John Keats, Letter to George and Thomas Keats of December 22, 1817, in *The Complete Poetical Works of John Keats*, ed. H. E. Scudder (Boston: Riverside Press, 1899), p. 277.
15. Ralph Waldo Emerson, *Ralph Waldo Emerson: Selected Essays* (1844; New York: Penguin, 1982), p. 274.
16. Evelyn Fox Keller, *A Feeling for the Organism* (New York: Times Books, 1984), pp. 200–204.
17. Arthur Zajonc, *Meditation as Contemplative Inquiry* (Great Barrington, MA: Lindisfarne Press, 2009).
18. Rainer Maria Rilke, *Letters to a Young Poet*, trans. R. Snell (1903; New York: Dover, 2002), p. 45.
19. Johann Wolfgang von Goethe, *Scientific Studies*, ed. and trans. D. Miller (1821; New York: Suhrkamp, 1988), p. 307.
20. Erwin Schrödinger, *Mind and Matter* (1958; Cambridge, GB: Cambridge University Press, 1967).
21. Pierre Hadot, *What Is Ancient Philosophy?* trans. M. Chase (Cambridge, MA: Harvard University Press, 2002), pp. 274, xiii.
22. Maurice Merleau-Ponty, *Phenomenology of Perception*, trans. C. Smith (London: Routledge, 1962), preface.
23. Goethe, *Scientific Studies*, p. 39.
24. Keller, *A Feeling*, p. 200.
25. Douglas Sloan, *Insight-Imagination* (Westport, CT: Greenwood Press,1993). Robert J. Sternberg and Janet E. Davidson, *The Nature of Insight* (Cambridge, MA: MIT Press, 1995).
26. Simone Weil, *Gravity and Grace*, trans. E. Crawford (New York: Routledge, 2002).
27. Ralph Waldo Emerson, *The Complete Works of Ralph Waldo Emerson*, Centenary Edition, vol. 8, *Letters and Social Aims*, ed. Edward Waldo Emerson (1875; Boston: Houghton Mifflin, 1903–1904), p. 365.

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