

Contemplative Pedagogy and the Sciences:
The Place of Contemplation Within an Integrative Education

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ABSTRACT

The teaching of the sciences, as with all other disciplines, can benefit by inclusion of contemplative exercises in the pedagogy of science instruction. In this article I situate the contemplative within the larger framework of an integrative undergraduate education, and I emphasize the central role of contemplative practices in the discovery process. Albert Einstein's path to his remarkable scientific achievements helps us to see what capacities are drawn on in the process of discovery, and thereby what kinds of contemplative exercises can be useful to this process.

"When someone goes up by these stages, he has come close to reaching the goal."¹
-- Plato, *Symposium*

"There is no logical path leading to these laws [of nature], but only intuition, supported by sympathetic understanding of experience."²
--Albert Einstein

¹ Plato, *Symposium* transl. Christopher Gill (NY: Penguin, 1999), p. 49

² Arthur I. Miller, *Insights of Genius*, (N Y: Springer – Verlag, 1996), p. 369.

In the Symposium, Plato's remarkable dialogue on love, Socrates is placed among a circle of friends with diverse professions and backgrounds.³ In other words, the Symposium has a clear interdisciplinary character. In a distinctive and particular way he stands between two central figures in the dialogue: Diotima – who is part philosopher and part priestess – and the Athenian statesman Alcibiades. Through his relations to Diotima and Alcibiades, Socrates is placed between the contemplative and active life: *vita contemplativa and vita activa*. In what follows I would like to use Plato's Symposium, together with the life of Albert Einstein, as a twin pictures that can instruct us concerning the important place of contemplation within an integrative education.⁴ I will give special attention to the role that contemplation can play in the sciences supporting a pedagogy of attention, insight, creativity, and compassion action.

An Ancient Model

In celebration of Agathon's prize-winning first tragedy, a group of Agathon's close friends gather on a beautiful summer's evening, with the scent of orange blossoms in the air. They water down the wine, and send the flute girls away, in order that they might eulogize love with clear minds, each in turn according to their disposition. The circle includes the playwright Aristophanes, the physician Erixymachus, the poet and orator Agathon, and others. In modern parlance, we might say it would be an interdisciplinary examination of love, each speaker offering a view of love from their unique vantage point.

Having heard the eulogies of love delivered by his companions, Socrates does not offer the group his own thoughts on love, but instead relates the story of his conversations with the woman of Mantinea called Diotima on love. Socrates, Athens' greatest teacher becomes, for a time, the humble, slow-witted student, attempting to understand the teachings of the wise Diotima. From her he learns that, "Love is neither beautiful nor good," for Love seeks that which it lacks. As the child of Poverty and Resource, Love is an intermediate spirit, a *daimon* who moves in the realm between the gods and humans, seeking beauty and the good. Far from the glorious picture of Love painted by Agathon, Love is poor, tough, "with hardened skin, without shoes or home. He always sleeps rough, on the ground, with no bed, lying in doorways and by roads in the open air... always in a state of need." But from his father Resource, he gains the qualities of bravery, intensity, and a lifelong search for wisdom. Wisdom is beautiful, and Love is love of beauty.

Born of contradiction, Love is neither mortal nor immortal. Seeking immortality Love desires reproduction – of either the body or the mind – so that he may live on long after his death through his progeny, be it via a child or a beautiful discourse. (Think of this very dialogue, a fruit of Plato's mind now over 2000 years old, whose ideas animate us still.) Diotima's teachings on love culminate in her famous description of the staircase or ladder of love, what she calls "the final vision of the mysteries." The first rung of the ladder is love of a single body

³ All references to the Symposium are from Plato, *The Symposium*, translated by Christopher Gill (N.Y.: Penguin Books, 1999).

⁴ Parker Palmer and Arthur Zajonc, *The Heart of Higher Education: A Call to Renewal* (San Francisco: Jossey-Bass, 2010).

and the production of beautiful discourses that are generated by that single love. Rising to the next rung, the youth realizes that all bodies share in this corporeal beauty, and so turns from the one to the many. With the third rung the student of love realizes that the beauty of the mind exceeds that of the body. Even if a person is not outwardly attractive, the beauty of their mind will stimulate us to love him and converse in uplifting ways. As he matures and his perspective widens, he experiences the boundless sea of knowledge and its eternal “forms” awoken in the striving youth “many beautiful and magnificent discourses and ideas.” Finally, Diotima explains, he is ready for the ultimate, transcendent “goal of love’s ways,” which is beauty itself, without outer form, unchanging, absolute and unrepresented. It is “nothing other than *that* beauty itself... and he can complete the process of learning what beauty really is.” And furthermore, the sight of divine beauty, says Diotima, give birth to true Virtue. We have reached the top rung of the ladder of love, and a vision of love that is most difficult to understand. Yet Diotima’s method is clear.

The initial set of eulogies delivered by Agathon’s diverse group of friends circled love, but all of them stayed at the same level. To my mind, they form a kind of horizontal plane criss-crossed by many roads and paths: the science of Eryximachus, the humanities of Agathon and Aristophanes, the social sciences of Pausanius ... Only Socrates, with the help of the wise woman of Mantinea (Diotima), breaks free of the plane inhabited by his companions and rises stage by stage to higher and higher considerations of love, from the first love of a single beautiful body, to the love of knowledge, and finally to the love of transcendent beauty that is completely without outer form, but that awakens in us the good. This is a contemplative path and education, one that stretches from the horizontal plane created by the first set of eulogies, upward. An entirely new axis or orientation is created by Diotima and Socrates, a vertical pathway, a staircase or ladder to be climbed by meditating on love.

The ascent of the ladder of love is wholly dependent on the development of the person seeking love. Most will rest content with the love a single person or body. A few will rise to the love of knowledge. It is a rare soul who makes it to the top rung where the culminating experience of love is achieved. Diotima is not sure that even Socrates will understand her teaching. “The purpose of these rites,” she says, “is to reach the final vision of the mysteries; and I’m not sure you could manage this.”⁵ We are, with Socrates, instructed about the ascent to love in its most universal and sublime form, the experience of which demands of us a long schooling and self-transformation at the lower stages of love. The French classicist Pierre Hadot emphasizes this aspect of ancient Greek philosophy in his book, *What is Ancient Philosophy?*⁶ Hadot argues convincingly that ancient philosophy was a “way of life” that offered the practitioner an “askēsis” or strict self-discipline and transformative practices for life, not merely a set of logical arguments. Through our study of the Symposium, we are invited to take up an *askēsis* whose project is that formation of our minds, which makes the ascent possible. To the circle of disciplinary considerations of love is added a contemplative and transformative element.

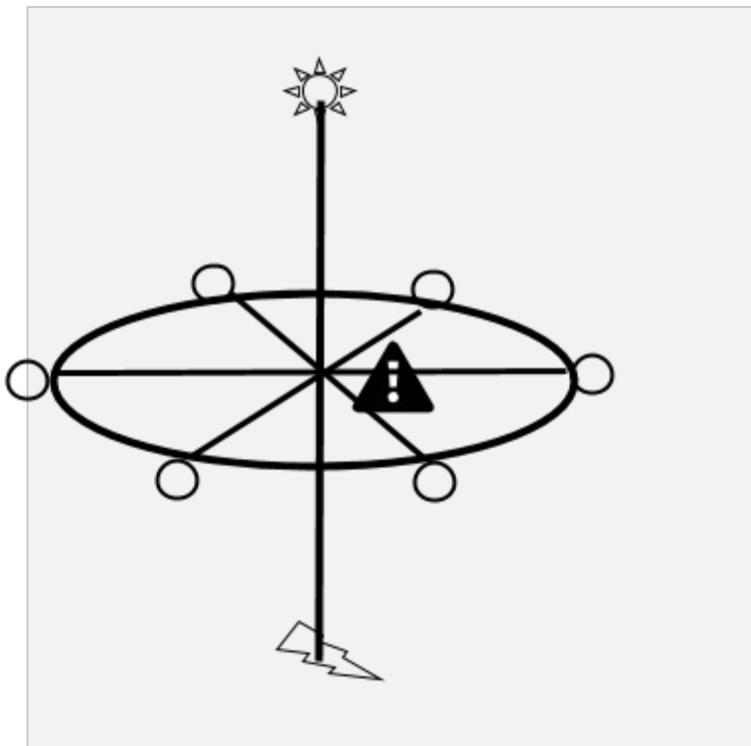
But Diotima’s ladder leads not only up but down. No sooner has Socrates finished relating Diotima’s exalted, even transcendent teaching on love, than the handsome but drunken Alcibiades enters Agathon’s house, crashing the party. In his hair is a garland of flowers

⁵ Symposium, p. 47.

⁶ Pierre Hadot, *What is Ancient Philosophy?* (Cambridge, MA: Harvard University Press, 2002).

and ribbons, and he is supported by a flute-girl and others in his party who keep him upright. Startled to find his beloved teacher Socrates in the company, Alcibiades is cajoled into giving his own eulogy. But Alcibiades insists that if he is to give praise, then he must praise Socrates, which he does with candor and honesty. As Alcibiades proceeds, it gradually becomes clear that Socrates shares many of the rough characteristics of the *daimon* Love. He seems rough on the outside, but on the inside he is godlike, “so divine, golden, so utterly beautiful and amazing.”⁷ Socrates is a lover of beauty and virtue, and he is always living in a manner that respects and practices the ways of love “with exceptional care.”⁸ His dedication to his friends, his tireless seeking after wisdom, his poise in battle, and equanimity in the face of danger and death, all these make him the embodiment of love, an exemplar of love *in life*. Socrates is shown to be a contemplative who is capable of treading the ladder of love to its highest rung, but he never forgets his companions and his worldly work of philosophy that he practiced together with them in the streets and markets of Athens. In this way, Socrates is placed at the center of a community of diverse and inquiring friends, but also between Diotima and Alcibiades: the ideal and the practical (*sophia and phronesis*). Plato’s model of learning is at once interdisciplinary and transformative, and embraces both the contemplative and active life.

I want to use the picture of Socrates inhabiting a three-dimensional space of wide learning, personal formation through contemplative engagement, and meaningful action. With his example in mind, I want to turn to the purpose and methods of higher education and to the role of university in supporting the full engagement with all dimensions of our students’ education, and especially to the place of contemplative practice within the sciences.



⁷ Symposium p. 56.

⁸ Symposium, p. 50.

Problems in Paradise

Each of you comes from a fine institution. This small conference on contemplative education is being held at Amherst College, a great college. What more can one want from an educational institution than a great faculty, terrific facilities, and brilliant student body? Isn't this a bit of heaven? As you walk around campus, remind yourself that all these big buildings, all the students, faculty, staff and the sizable annual budget, all this is directed toward something totally invisible, the minds of our students. The cultivation of the human being, of students' minds is the single *raison d'être* for this investment. (Well, there is research going on too) Still, pretty amazing, no? So what could be the problem, why are faculty at countless schools, with questions of general education, pedagogy and curriculum? Amherst we have the abundance of Eden, AND the fruit of the tree of knowledge is securely in hand; a combination denied to Adam and Eve. What could possibly be wrong in paradise?

Are the critics of American universities right when they say, as Harvard College's former dean Harry Lewis emphatically states, "Harvard and our other great universities lost sight of the essential purpose of undergraduate education." They are neglecting the central task of helping students "learn who they are, to search for a larger purpose for their lives, and to leave college as better human beings."⁹ Echoing Lewis's sentiments, former Yale Law School dean Anthony Kronman argues in his book *Education's End* that the true purpose of higher education has been lost, namely, a deep exploration concerning "what life is for."

A college or university is not just a place for the transmission of knowledge but a forum for the exploration of life's mystery and meaning through the careful but critical reading of the great works of literary and philosophical imagination.¹⁰

Stanley Fish in his recent NY Times op ed, writes for many when he laments the monetization of higher education that measures education's "value" purely in terms of financial return on investment. And in a 2009 NY Times Op Ed the President of Harvard University, Drew Gilpin Faust, wrote about "The University's Crisis of Purpose" (Sept 1, 2009) saying,

"But even as we as a nation have embraced education as critical to economic growth and opportunity, we should remember that colleges and universities are about a great deal more than measurable utility. Unlike perhaps any other institutions in the world, they embrace the long view and nurture the kind of critical perspectives that look far beyond the present."..."As a nation, we need to ask more than this [utility] from our universities. Higher learning can offer individuals and societies a depth and breadth of vision absent from the inevitably myopic present. Human beings need meaning, understanding and perspective as well as jobs. The question should not be whether we

⁹ Harry Lewis, *Excellence without a Soul*, (NY: Public Affairs, 2007) p. xv.

¹⁰ Anthony Kronman, *Education's End: Why Our Colleges and Universities Have Given Up on the Meaning of Life*, (New Haven, CT: Yale University Press, 2007) p. 6.

can afford to believe in such purposes in these times, but whether we can afford not to.”

Each of these leaders in higher education points beyond utility and financial gain to a larger mission that higher education has and should continue to embrace. Depth, breadth, meaning, understanding, and perspective are the words used. What is the task of the university? To instruct in a discipline, surely. But beyond this, what? The author and poet (and English professor) Wendell Berry sums it up this way in his essay “The Loss of the University,”

The thing being made in a university is humanity. . . . [W]hat universities . . . are *mandated* to make or to help to make is human beings in the fullest sense of those words—not just trained workers or knowledgeable citizens but responsible heirs and members of human culture. . . . Underlying the idea of a university—the bringing together, the combining into one, of all the disciplines—is the idea that good work and good citizenship are the inevitable by-products of the making of a good—that is, a fully developed—human being.¹¹

This is a formidable mandate: the making of the human being. To begin with, what is the image we have of the human being these days? Who sits before us in the classroom, or works beside us at the lab bench? What does it mean to be human? This image informs our approach to teaching and learning either consciously or unconsciously. In my view we suffer today from a profoundly impoverished image of the human being and of our world. We have a diminished and inadequate ontology and anthropology. What is needed is a truer, multidimensional understanding of the human being that will in turn lead to a comparably rich, multidimensional education. Only then can we hope that, through the collaborative effort of teachers and learners, we might, as Wendell Berry puts it, “make human beings in the fullest sense of those words.” I want to explore with you some of the lost or neglected “dimensions” of ourselves and of higher education. Only when we knit together the multiple strands of learning and teaching will we have an education that addresses the depth, breath and meaning dimensions of life. As will become evident, contemplative exercises can contribute substantially to this agenda. They offer a set of practices that support student learning and development through sustained experiential engagement and empathetic connection.

The Several Dimensions of Higher Education:

Breadth

Space is multi-dimensional (three-dimensional, if we leave aside relativity and string theory). Our learning too is multidimensional. As an undergraduate, one is asked early in one’s studies to declare a major area of disciplinary concentration: physics, English, neuroscience, French, etc. This is like a first axis or straight line highway put down through the vast territory of learning. The full mastery of a single area of human knowledge or endeavor is of signal importance. One eventually comes to stand at the shoreline that separates what is understood

¹¹ Wendell Berry, “The Loss of the University,” *Home Economics* (San Francisco: North Point Press, 1987), p. 77.

and what is not. It is the province of discovery, innovation, and the new to which we will return. But is mastery of a single domain really enough? Does it suffice to treat adequately the complex problems we face today?

Ever since Francis Bacon mapped knowledge in the 17th century, and Diderot and D'Alembert refined and codified his map of knowledge in their 18th century *Encyclopédie*, universities around the world have adopted the divisions they made with the consequence that thousands of colleges and universities offer an essentially identical set of disciplinary concentrations. Lines are drawn by the dominant power (in this case the leaders of scientific revolution and the French Enlightenment) and centuries later we are still living with that legacy. Did Diderot and D'Alembert get it right? Should there be any lines at all? Should the axes through the intellectual landscape be more like meandering creeks or twisted footpaths than linear highways? Are we constrained to walk one path only?

Wendell Berry remarked that the idea of the university is "the bringing together, the combining into one, of all the disciplines." Interdisciplinary teaching and research bring individuals together from diverse disciplines to tackle problems using multiple lines of inquiry and expertise. Plato brought together a wide range of characters in the *Symposium* and each offered a distinct perspective on love, one that accorded with their profession and person. Yet simple juxtaposition of different views is no guarantee of a genuine synthesis or creative insight. For that to occur, the community of discourse must be internalized so it can live within a single person with sufficient intensity to overcome the mind's inertia, its resistance to change. The whole is then reflected in the individual, and in such measure that it can become an active force that liberates and animates. Remember that all the voices of the Symposium lived equally in Plato's mind. We can ask, what contemplative exercises can support the student's engagement with widely diverse voices and views?

When Albert Einstein was an obscure young clerk at the Berne patent office in Switzerland, he joined up with two new friends and together they created the tiny *Akademie Olympia*. Einstein had recently completed his studies in physics at the ETH (Eidgenössische Technische Hochschule) in Zurich (the MIT of Switzerland). His friends Solovine and Habicht were not scientists but students of philosophy and mathematics, respectively. Over the three years that their little academy existed, from 1902 to 1905, the group read and debated such books as Hume's *Treatise of Human Nature*, Spinoza's *Ethics*, Mill's *A System of Logic*, Mach's *Analysis of Sensations*, Poincaré's *Science and Hypotheses*, and Cervantes' *Don Quixote*. They hiked the magnificent Berner Oberland, in the evenings Einstein entertained them with his violin, they would eat what they could afford (i.e. not much), and they talked; above all, they talked. Einstein's breadth of thought was greatly extended by the intensive, wide-ranging, intellectual intercourse he had with Solovine and Habicht. In looking back on the *Olympia Academy*, Solovine said, "Our material situation was far from being brilliant; but, in spite of that, what enthusiasm we had, what a passion for the things that really mattered."¹² And Einstein noted similarly, "We had a wonderful time in those days in Berne in our cheerful 'Academy,' which was less childish than those respectable ones which I later got to know only too well."¹³

¹² Ronald W. Clark, *Einstein: the Life and Times*, (NY: HarperCollins, 1984), p. 80.

¹³ <http://www.aip.org/history/einstein/ae12.htm> Last accessed on January 22, 2011.

Einstein's obscurity vanished in 1905, the year the Academy ended, when he published four landmark papers in one year, including his discovery of special relativity and his equation $E=mc^2$. He would later remark on the importance of Ernst Mach, David Hume, and Henri Poincaré and other authors read in the Academy, for his accomplishments during that astonishing year of creativity. Through his friends and their intensive conversations, he had succeeded in integrating into his own thinking the breadth of thought these giants offered, their critical stance, and divergent views, and Einstein was deeply helped thereby. Of Ernst Mach, for example, Einstein would write, "I see Mach's greatness in his incorruptible skepticism and independence..."¹⁴ an independence that appealed to Einstein's own personality. The Academy offered a community of ardent intellectual conversation that animated Einstein and opened him to fresh notions of what space, time, matter, energy and light really were. The consequent revolution wrought by Einstein has still not been fully appreciated.

Contrast Einstein's experience with our curricular strategies for insuring breadth of study. The juxtaposition of one course next to the other, as is common with distribution requirements, is not in my view, a satisfactory way of addressing the issue of breadth. We need models of engagement much more like the Olympia Academy than a sushi menu. Look around you, who would you invite to an incandescent conversation on science, art, philosophy, social justice, environmentalism...? With whom would you hike the White Mountains or the high Sierras, and what books would you have in your backpack. Broaden yourself by engaging difference. The observations and thoughts of others are doors that open onto rooms whose existence you may never have imagined. Those others include the voices of great thinkers and artist of the past, as well as your contemporaries and friends. Treated in this way, we can internalize the breadth of our world and civilization, and are the richer for it. What might be the contribution of contemplative pedagogy to such intensive engagements? (In the Appendix, I offer an explicit description of a range of relevant contemplative exercises for each section of this paper.)

Yet as rich as interdisciplinary study and research can be, it fails to integrate the "vertical" dimensions of human experience and inquiry, of human aspiration and action. It's as if one were content with the geometry of Flatland, blithely unaware of a missing dimension to space. In Plato's *Symposium* the figures of Diotima and Alcibiades demonstrate to us philosophy's labors of ascent (*anodos*) and descent (*kathodos*), the complementary modalities of *vita contemplativa* and the *vita activa*, which comprise the largely neglected vertical dimension to education whose absence is so lamented by Lewis and Kronman among others.¹⁵ What are the distinguishing features of the vertical dimension, why are they significant, and how does one integrate them into higher education? Here contemplative exercises can make an especially important contribution.

¹⁴ Clark, *Einstein*, p. 60.

¹⁵ I am grateful to Marcelo Stamm for his discussion with me concerning Plato's and Kant's notion of philosophy as a "labor of ascent." See also Dieter Heinrich and David S. Pacini, *Between Kant and Hegel* (Cambridge, MA: Harvard University Press, 2003), p. 67.

The Heights and Depths

The ascent depicted by Plato in the Symposium is one in which a more profound understanding of love unfolds stage by stage. True insight requires that the philosopher leave the cave of everyday conventional thought in order to see more clearly and by a new light. One labors not only to understand but to create, for here is the place of the new. While we cannot engineer creativity or manufacture insight, we can ask after the conditions, practices, and capacities that support innovation and insight. The conditions for creativity are several, but three of the most important are the ability to 1) sustain one's attention freely on an object or question for a long period of time, 2) engage deeply with paradox or contradiction, and 3) nurture the moment of insight so as to bring it into language, be it words or mathematics. In the genesis of both the special and general theories of relativity, we witness a classic instance of these three conditions.

Einstein tells us that the sought for "principle [of relativity] resulted from a paradox upon which I had already hit at the age of sixteen." We see that Einstein would sustain his attention on a question for ten years before discovering the principle of relativity. He wondered, what would a light wave look like if pursued at the speed of light? Could he catch up with light, rendering it stationary? But that would be in direct conflict with the recently established theory of electromagnetism by James Clerk Maxwell. No such possibility existed in theory, but catching up with any other type of moving object was certainly possible. This was the contradiction he contemplated for the next ten years and that led to his discovery of special relativity.¹⁶ It is an example of the second condition for creative discovery, sustained engagement with paradox and contradiction.

The general theory of relativity was likewise born of a paradox, what Einstein called "the happiest thought of my life." Sitting in his chair in 1907 at the Bern patent office, he suddenly wondered how he could distinguish between himself sitting in his chair in the gravitational attraction of the earth, and being accelerated up. As he pondered the two situations, it seemed like the two different situations would be indistinguishable experimentally. Billions of people sit in chairs every day without having this thought! Or, consider the opposite situation. If he, Einstein, were to fall off a tall building, gravity would literally disappear as far as all experimental effects could determine (at least until he hit the ground!). This has become enshrined as the "equivalence principle" in physics, i.e. gravity and acceleration are "equivalent." But it would not be until 1916, nine years later, that he would find a way to complete his general theory of relativity. Engagement with contradiction is a common feature of the discoveries in modern physics, for example with Heisenberg's uncertainty principles as well.

The circumstances of Einstein's final resolution to the problem of general relativity are remarkable and valuable to us in seeking a form of higher education that supports the creative act. At a 1931 dinner party in Charlie Chaplin's Beverly Hills residence, Albert Einstein's wife Elsa

¹⁶ Another stimulus was the contradictory causal accounts of Faraday's law of electromagnet induction. In one frame of reference it is explained in terms of electric forces and in another frame as a purely magnetic effect.

gave the following report on the days in 1916 prior to Albert Einstein's discovery.¹⁷ Elsa's story is recounted by Chaplin in his autobiography.

The Doctor came down in his dressing gown as usual for breakfast but he hardly touched a thing. I thought something was wrong, so I asked what was troubling him. "Darling," he said, "I have a wonderful idea." And after drinking his coffee, he went to the piano and started playing. Now and again he would stop, making a few notes then repeat: "I've got a wonderful idea, a marvelous idea!" I said: "Then for goodness' sake tell me what it is, don't keep me in suspense." He said: "It's difficult, I still have to work it out." She told me he continued playing the piano and making notes for about half an hour, then went upstairs to his study, telling her that he did not wish to be disturbed, and remained there for two weeks. "Each day I sent him up his meals," she said, "and in the evening he would walk a little for exercise, then return to his work again. Eventually," she said, "he came down from his study looking very pale. 'That's it,' he told me, wearily putting two sheets of paper on the table. And that was his theory of relativity."¹⁸

Einstein's delight, his joy in the process of discovery is evident here. His use of piano playing as a means of sustaining his creative openness to the moment of insight points to the need for a gentle touch when drawing a new idea into a form that can be articulated in words and equations. This is my own experience also as a physicist in research. New ideas are shy; they retreat before the old patterns of thinking. One needs a means of supporting the novel and ephemeral.

Sustained Voluntary Attention

In these accounts of Einstein's acts of creative genius, we can discern the three aspects I have suggested as important to cultivate in ourselves and in our students. The first is the capacity for *sustained voluntary attention*. That is, one strengthens the ability to direct one's attention to a topic, thought, object or question of one's choosing in a sustained manner. The founder of scientific psychology William James wrote in *Principles of Psychology*,

The faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will.... An education which should improve this faculty would be *the education par excellence*. But it is easier to define this ideal than to give practical directions for bringing it about.¹⁹

Indeed, our attention does wander over and over again. But William James was right in his assessment that "the education which should improve this faculty would be the education *par excellence*." The challenge of giving practical directions for the cultivation of attention is one that many professors have taken up in recent years. They have been making use of the contemplative exercises of mindfulness on an object or process, for example the breath, as a means of strengthening attention. In recent years, neuroscience research has convincingly

¹⁷ Quoted in *Einstein and Religion*, Max Jammer (Princeton, NJ: Princeton University Press, 1999), p. 56.

¹⁸ Charles Chaplin, *My Autobiography* (London: Bodley Head, 1964), pp. 346-347.

¹⁹ William James, *Principles of Psychology*, (NY: Holt and Co, 1890), vol. 1, p. 424. Available as a Gogle Book.

demonstrated that contemplative practice of this kind can enhance attention.²⁰ Improved attention is of obvious value in all academic contexts, and for life more generally, and so well worth including in our pedagogy starting at least in the high school years and extending on into college.²¹ (See Appendix)

Since 1997 the academic program of the Center for Contemplative Mind in Society (www.contemplativemind.org) has been working with many hundreds of professors and university administrators developing the field of contemplative pedagogy. Each year through conferences, summer programs, fellowships, retreats, and online resources, the Center has supported faculty in making their curriculum and pedagogical methods more reflective and contemplative. Recently the Center has founded the Association for Contemplative Mind in Higher Education (www.acmhe.org). This is a professional association which allows colleagues from colleges and universities around the world to interact with each other and share their writings and ideas.

Nearly every area of higher and professional education is now being taught with contemplative exercises for the training of attention from poetry to biology, from medicine to law. There is a fast growing appreciation contemplative pedagogy that makes extensive use of secular contemplative exercises both for general capacity building (such as strengthening attention or emotional balance), as well as subject-oriented practices designed for a particular class. For example, the contemplative art of “beholding” in art history and compassion practices that shift game theoretical outcomes in an economics class are both being taught at Amherst College. (See Appendix for details regarding these and other practices.)

Sustaining Contradictions

In addition to sustained voluntary attention, Einstein was able to productively engage paradox and contradiction. We normally avoid paradox, but like a Zen master working with a koan, Einstein sought out contradictions and worked with them for years until finally they resolved themselves. Importantly, the resolution was only possible at a higher level than that of the paradox itself. If we are limited, for example, to classical notions of space, time, and matter, the paradoxes that lay at the root of Einstein's theory of relativity persist. Only by fundamentally reconceiving the very nature of these fundamental aspects of reality do the paradoxes resolve, but only if we are willing and able to make profound psychological and ontology changes to our world view. To make such profound ontological shifts requires an extraordinary freedom of thought, one where the conventional patterns and habits of thinking are broken and replaced by a new and more fluid conception of reality. The contemplative traditions have long maintained that the exercises they have developed are designed for exactly this purpose, that is, to free the mind from its habitual and mistaken conceptions of the world and the Self. Contemplative exercises are now being adapted and used in completely secular settings in thousands of classrooms to this end.

²⁰ For further information see Richard Davidson's Center for Investigating Healthy Minds, <http://www.investigatinghealthyminds.org/>. Clifford Saron at the U. C. Davis Center for Mind and Brain, the Shamatha Project, <http://mindbrain.ucdavis.edu/labs/Saron/shamatha-project>, Alan Wallace, Santa Barbara Institute.

²¹ Arthur Zajonc, *Meditation as Contemplative Inquiry*, (Great Barrington, MA: Lindisfarne Press, 2009), and see The Association for Contemplative Mind in Higher Education, www.acmhe.org.

To be concrete, in the case of relativity, we learn for example that the lengths of moving objects are foreshortened in the direction of motion, that moving clocks run slow, and that the notion of "now," that is, of simultaneity, is different for different states of motion. As a consequence, the notion of *primary qualities* such as length and mass, as properties inherent to things themselves, a view which has been common view since Galileo, Descartes, Locke, and Newton, is undermined by Einstein's theory of relativity. In the language of David Bohm, "the analysis of the world into constituent object has been replaced by its analysis in terms of events and processes."²² The significance of this insight is hard to overstate, but also difficult to understand. An aid in this regard is the use of what is termed in the Buddhist tradition, *analytical meditation*. Analytical meditation works with a logically connected sequence of thoughts that leads to an insight of the type encapsulated by Bohm. Once one has come to clarity concerning the insight, a feeling of appreciative understanding arises. One then pauses to dwell on the insight, allowing it to sink in, and so to be much more deeply appreciated.²³ The latter part of the exercise is called *calm abiding* and is important in shifting one's way of experiencing the world. Logical understanding is usually not enough to effect a transformation. We know cigarette smoking is bad for our health, but stopping requires change at a whole other level. In this practice, one moves between analytical meditation and calm abiding.

From considerations like those entailed by relativity and quantum mechanics, we are learning from science that at its most fundamental level our world and the scientific study of it is really about *experience* and *relationships*, not about inert objects and their mechanistic interactions. I believe this can have significant implications for higher education especially if we find ways to both understand through analysis the insights of modern research and make them the subject of calm abiding. In particular our commitments should be:

- 1) to become self-conscious concerning our *relationships* to ourselves, others, and our world and to appreciate the deep significance of relationships for the experience of reality,
- 2) to deepen and widen our range of *experience*, both sensory and intellectual, to include the domain of contemplative experience, granting such experiences equal standing.

Cultivating attention usually begins on a single simple object, be it a paperclip or the breath. Strengthening concentration is certainly a good thing, valuable in every subject area. However, sustaining attention in the absence of easy clarity, which is the situation of paradox or contradiction, requires another level of contemplative engagement. To these two stages is added a third, that of *contemplative insight or knowing*. In the account given by Einstein's wife of the discovery of general relativity, we see Einstein holding open the time of creativity by playing the piano or, in other instances, his beloved violin, followed by an intensive period during which the elusive ideas are cast into equations and words, which are then open to verification or falsification.

²² David Bohm, *The Special Theory of Relativity* (NY: Routledge, 1996), p. 114

²³ Dalai Lama and Jeffery Hopkins, *How to See Yourself As you Really Are* (NY: Simon and Schuster), p. 168.

Conditions for Creativity and Insight

Scholars of creativity and insight distinguish four phases.²⁴ The first is *mental preparation* which consists in confronting the paradox or contradiction at the root of the problem in a serious and sustained way. The second phase is *incubation* during which time one moves between active struggle with the problem and receptive disengagement. The third phase is *illumination*, at which moment a flash of insight appears, one that must be grounded or held. In his discovery of quaternions, for example, the mathematician William Rowan Hamilton was walking across the Broom Bridge in Dublin with his wife. Suddenly a problem he had long studied was solved. Knowing how elusive such solutions can be, Hamilton carved the crucial identity into the wooden railing of the bridge with his penknife. The final fourth phase is *verification*. After all, insights can be mistaken.

In a 1904 essay, Poincaré was aware of these stages and drew special attention to the means by which we attain the new. He wrote, "it is by logic we prove, it is by intuition we invent." In 1908, he concluded that "logic, therefore, remains barren unless fertilized by intuition." "To make geometry, or to make any science, something else than pure logic is necessary. To designate the something else we have no word other than *intuition*."²⁵ Albert Einstein would say it this way, "There is no logical path leading to these laws [of nature], but only intuition, supported by sympathetic understanding of experience."²⁶ The historian of science Arthur Miller recognized that only Albert Einstein was willing to undertake the labors of ascent (as Plato might have called it) required to resolve the conflict between mechanics and electrodynamics. "Einstein, alone, was willing to *redefine* the concept of intuition to a level of abstraction higher than in the mechanics and electrodynamics of 1905."²⁷

While discovery always contained in it elements of genius and grace, higher education can nonetheless prepare the ground and provide the conditions for creativity and insight. For example, contemplative exercises come in two types. The first makes use of strengthened concentration to attend to a single simple object or later on paradox. But a complementary exercise makes use of "open awareness." In open awareness one releases the object of concentration from the mind and sustains a lucid yet undirected, receptive mental state. The movement between concentrated attention and open awareness is much like the required movement between the two phases of mental preparation and incubation described above. By practicing this pair of contemplative exercises, student or researcher becomes accustomed to the inner cognitive movement or rhythm of attention required for creative insights. It is, in my opinion, a pedagogy for creativity. Intuitions arise in the open space of our receptive attention. The French philosopher Simone Weil was referring to this phenomenon when she wrote, "Grace fills empty spaces, but it can only enter where there is a void to receive it, and it is grace itself which makes this void."²⁸ Intuition is an instance of grace, even if the preparation phase has been long and arduous, and requires an open mind or "void" to receive it. We need to practice what John Keats called "negative capability," which is a form of awareness that "is capable of being in uncertainties, Mysteries, doubts without any irritable reaching after fact &

²⁴ Robert J Sternberg and Janet E. Davidson, *The Nature Of Insight*, (Cambridge, MA: MIT press, 1995).

²⁵ Arthur I. Miller, *Insights of Genius*, (N Y: Springer – Verlag, 1996), pp. 351-353.

²⁶ P. 369.

²⁷ P. 373.

²⁸ Simone Weil, *Gravity and Grace*, (NY: Routledge, 2002), p. 10.

reason."²⁹ Logical reasoning does not suffice for real discover. Only what Poincaré and Einstein call intuition can reach across the divide and delicately coax an insight into a formula, paint, notes, or words. Piano playing can be a real help.

The Descent

Insights are barren unless you can make them real. It may take two weeks in isolation to find the means of expressing what you have seen intuitively in an instant, as was the case for Einstein's general theory of relativity. When Hamilton discovered quaternions he immediately realized that the next few years would be spent in working out the implications. Plato's dialogue on love does not end with Diotima's teachings concerning the ascent to beauty. Instead Plato introduces the all-too-earthly character of Alcibiades, who will represent for us the descent to practical life, *vita activa*. The testimony of Alcibiades is essential to an appreciation of love as it lives in the world through Socrates' life and teaching. Socrates is the embodiment of love. If we listen to Diotima only, we risk the danger of leading a life disconnected from incarnate reality. If we listen to Alcibiades alone, we risk a life disconnected from our ideals. In Socrates we see the synthesis of the contemplative and active lives. He can stand for hours pondering a single question; in battle he can save the life of his friend, insisting that all honors for the deed go to Alcibiades. At every point in the story told by Plato, Socrates leads an ethical life dedicated to the betterment of his students and friends, and in doing so he stands between Diotima and Alcibiades.

A college education is as much about embodying what we learn as it is about the learning itself. How is it we make what we know fruitful for others? Our students seek to wed knowledge with action, insight with ideals. The rise of centers for community engagement and service learning on countless campuses is testimony to students' interest and commitment to "making it real." In a recent conversation with a Gates scholar at Amherst College, I learned how each week for the last three years the student tutored those who, like him, grew up destitute and with little understanding of English. He plans on going on to become a physician; others will take up teaching, law, or business. In every vocation, moral issues will arise. How can we prepare our students for them? The questions we place at the center of our contemplative attention can be our own. Sustained, balanced, meditative attention is far from brooding. It offers students a way of reflecting on their ideals, aspirations and values.

In the language of the Stoics, Socrates and Amherst's Gates scholar were committed to expanding their "circles of affection" and so treated those around him as he would his own family and kin.³⁰ Einstein also saw this as the high aspiration of humanity.

²⁹ Duncan Wu, *Romanticism: an anthology*. 3rd Edition (London: Blackwell, 2005), p.1351

³⁰ Hierocles (100 AD), as drawn from Stobaeus (4.671,7-673,11)

Each of us is, as it were, entirely encompassed by many circles, some smaller, others larger, the latter enclosing the former on the basis of their different and unequal dispositions relative to each other. The first and closest circle is the one which a person has drawn as though around a centre, his own mind. This circle encloses the body and anything taken for the sake of the body. For it is virtually the smallest circle, and almost touches the centre itself. Next, the second one further removed from the centre but enclosing the first circle; this contains parents, siblings, wife and children. The third one has in it uncles and aunts, grandparents, nephews, nieces, and cousins. The next circle includes the other relatives, and this is followed by the circle of local residents, then the circle of fellow-tribesmen, next that of fellow-citizens, and then in the same way the circle of people from neighboring towns, and the circle of fellow-countrymen. The outermost and largest circle, which encompasses all the rest, is that of the whole human

The human being is a part of a whole, called by us "the universe," a limited part in space and time. He experiences himself his thoughts feelings as something separated from the rest... a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few people nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty.

The importance of overcoming the delusion of separateness has never been greater. The interdependencies within ecology, economy, and society have never been more evident, and the consequences of neglecting them have never been more dangerous. Likewise, on the basis of quantum physics we now speak of quantum holism and entanglement as remarkable but definite features of the physical world. Wholes are now as real as parts. Recent research reported by Stanford's Center for Compassion and Altruism Research and Education has shown that compassion can be cultivated through meditative exercises; the circles of affection can be extended.³¹

In a recent gathering on leadership and the contemplative aspects of leadership education, Sandra Sucher of the Harvard Business School spoke eloquently concerning the course she teaches on Moral Leadership, a Harvard course initiated by the legendary teacher and activist Robert Coles. Through the case study method students are placed on the horns of a moral dilemma. The financial realities of the case press forcefully in one direction, while ethical and perhaps even legal considerations point in a very different direction. When presented vividly, which is to say *experientially*, the struggle of students to discern the right way forward can be very real. What becomes completely clear is that leading a business, which many of Sucher's students will ultimately do, entails far more than financial analysis or people skills. If we pause to consider the deep foundations of vocation, we find that personal character and moral discernment are of enormous importance. Whatever we can do as educators to support the development of character and discernment among future business leaders will be an investment that repays society handsomely in the form of a trustworthy business community, something whose value has never been more evident than today. Is the practice of medicine, law, government service, teaching, scientific research, ... any different? Do they not also rest on the same moral foundations?³²

If ethics forms the foundation for right action in one's disciplinary or vocational field, then it seems to me that the aspiration toward an ideal is the star high above by which students

race. Once these [circles] have all been surveyed, it is the task of a well-tempered man, in his proper treatment of each group, to draw the circles together somehow towards the centre, and to keep zealously transferring those from the enclosing circles into the enclosed ones... It is incumbent on us to respect people from the third circle as if they were those from the second, and again to respect our other relatives as if they were those from the third circle. For although the greater distance in blood will remove some affection, we must try hard to assimilate them. The right point will be reached if, through our own initiative, we reduce the distance of the relationship with each person. The main procedure for this has been stated. But we should do more, in the terms of address we use, calling cousins brothers, and uncles and aunts, fathers and mothers... For this mode of address would be no slight mark of our affection for them all, and it would also stimulate and intensify the indicated contraction of the circles.

³¹ See the website <http://ccare.stanford.edu/>.

³² Arthur Zajonc, "From Scientific Imagination to Ethical Insight," in Kathleen Skubikowski, Catherine Wright, and Roman Graf, eds., *Social Justice Education*, (Sterling, VA: Stylus, 2009), pp. 56-69.

(and their teachers) seek to orient their lives. The aspiration to lead lives of meaning, purpose, and commitment is not passé. According to recent research by the Higher Education Research Institute at UCLA, half of students entering college declare that “to find my purpose in life” is a very important reason for attending college, and the percentage rises to 80% if one includes those who say it is at least a “somewhat important” reason.³³ The same research finds that “two-thirds of new freshman say that it is either very important or essential that college helps you to develop your personal values and enhances your self-understanding.”³⁴ These data confirm that students arrive on campus hoping their teachers and courses will help them to find purpose, enhance self-understanding, and develop personal values. As Lewis and Kronman state, too often as faculty we avoid these issues and fail to meet students’ expectations, whose hopes I think are fully legitimate.

An Integrative Education and Transformative Education

An integrative education is, as said at the outset, multidimensional. It includes the breadth of multiple perspectives and disciplines, but in a way that is not limited to simple juxtaposition. Instead, it proceeds in a manner that incorporates the varied perspectives of the literature and our colleagues into our own view. We live not only our original view, but the multiple views of others, synthesizing them. In the geometry of integrative education, this forms the broad horizontal plane of our public inquiry and discourse. To be complete, however, we need to include in our education a crucial vertical axis, one that allows for both ascent and descent. The ascent takes place through varied forms of contemplative practice. We learn to sustain our attention even in the face of paradox and contradiction with equanimity, and when insight arises, we know how to draw it steadily to us, finding the language and concepts that will allow it an active life. We can make use of analytical meditation and calm abiding as a way of deepening our relation to the insights. The final dimension of an integrative education is that of moral or altruistic action. Insight can remain barren or even harmful (think of Einstein’s $E=mc^2$ and the atom bomb), without an adequate moral foundation or ideals by which to lead a life.

The broad horizon of knowledge is thus joined with a contemplative epistemology that leads to insight and a moral commitment to action guided by one’s ideals. It is also a developmental vision of education, one that naturally supports the formation of capacities of insight and action in the student. The work of Robert Kegan,³⁵ Jack Mezirow,³⁶ and Sharon Parks³⁷ are representative of a much scholarship and research on the potential and the importance of a developmental perspective on adult learning. The contribution of contemplative pedagogy to student development can now be understood through the phenomenon of neuroplasticity.³⁸ But for the student and faculty member it is directly experience as an enrichment of the material being taught through an intimate, sustained, experiential encounter. This gives

³³ Alexander W. Astin, Helen S. Astin, and Jennifer A. Lindholm, *Cultivating the Spirit: How College Can Enhance Students Inner Lives*, (San Francisco, CA: Jossey-Bass, 2011), Kindle location 225.

³⁴ Kindle location 226.

³⁵ Robert Kegan, *The Evolving Self* (Cambridge, MA: Harvard University Press, ??).

³⁶ Jack Mezirow, *Learning as Transformation* (San Francisco: Jossey-Bass, 2000).

³⁷ Sharon Parks, *Big Questions, Worthy Dreams* (San Francisco: Jossey-Bass, 2000).

³⁸ Sara Lazar ??

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sufficient time for capacities to develop and insights to enter the space we have cleared to receive them. As Goethe wrote, “Every object, well-contemplated, opens a new organ in us.”³⁹ Contemplative education supports this growth and but also offers the means for engagement with the personal questions our students bring with them: “what is life for.”

³⁹ Johann Wolfgang von Goethe, my translation. ??

Appendix

Contemplative Exercises

In the course of my essay I raise the question concerning how contemplative exercises can help realize a multidimensional, integrative vision of higher education. In this appendix I want to be explicit concerning the exercises. I have used them in a wide variety of teaching contexts at Amherst College and beyond. I link them explicitly to the picture of education I have given above.

Breadth: Deep Listening and Contemplative Reading Exercises

I have argued that an intensive, open-minded engagement with the ideas of others is crucial to the education of our students and to the discovery process. Recall Einstein's Olympia Academy. In this vein, the contemplative practice of *deep listening* can be very helpful. Too often we do not fully attend to the views of others with a truly open mind. Critical reflection and evaluation is, of course, essential, but the predominance of this modality too often overshadows the equally important capacity for open-minded listening. Einstein needed to fully hear and understand his friends in order to evaluate their views. Likewise, if Mach and Poincaré's writings were to make their full impression on Einstein, then a deep engagement with them was essential. The exercise of *contemplative reading* can be real assistance in this regard.

Deep Listening Exercise

In deep listening students are paired off and given a prompt to which they each speak in turn. In the classroom context, it may well be a prompt that is related to an assigned reading or lecture topic. For example, if the class were on Einstein's view of time, the prompt might be, "In light of your readings on the direction of time, describe your own views on why time only flows from past to future." I would give the class five minutes or so to consider the question quietly, remembering what they have read on the subject and their opinions on the issue. They would be encouraged to contemplate the question individually and to journal for a while on it. When the preparations are complete, they then turn to their partners. The listeners are instructed to give the speakers their full attention and to resist the temptation to immediately respond or judge. They are simply to give the speakers their undivided attention. If their attention wanders, they are to observe that fact and return their attention to their speaking partners. After a time of 3-5 minutes, the teacher rings a bell or otherwise stops the process and has the listener say back to their partner what they heard: "I heard you say..." The original speaker then responds, making whatever corrections are necessary. Then the two switch roles and repeat the entire process.

In the classroom discussion that follows this exercise, students generally note how difficult it was to listen without judgment or interjecting an opinion. Also, they note how their attention wandered, which made summarizing what the other said especially difficult. The offering of our attention to another, fully and without judgment, is a great and precious gift, one we rarely give and one that is strengthened by practice.

Contemplative Reading

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There has long been a tradition of contemplative reading,⁴⁰ usually associated with sacred texts, but that tradition can be brought into the secular classroom situation with benefit. It can begin with something as simple as asking a student to read a short passage aloud in class. Usually they begin reading the passage too quickly, mumbling quietly to themselves. Gently breaking in and asking them to slow down, to speak louder, and to pronounce clearly helps them and the class to experience the passage more fully. One can prepare for contemplative reading by asking each student to identify one or more favorite passages as part of the reading assignment. Some are then asked to read their passage with care aloud in class, and then to say a few words of their own. Finally they read it aloud again without hurrying, allowing for an adequate pause before the next reading. The pace of the class slows down, the words of another person, often a great writer or thinker, sound in the room so all can hear and appreciate them.

Of course not everything we read can or need be read contemplatively, but with great texts, and even with certain passages, they repay us generously for the attention we give them. In one seminar class I teach, certain passages of Rilke, Thoreau, Simone Weil, and T. S. Eliot are introduced on the first day of class and are repeated in class from time-to-time, so that by the end of class the students know them by heart and have come to see their full range of significations. They become texts of the heart that carry an entire semester's striving within their sounds.

[FURTHER EXERCISES...]

⁴⁰ See David Haskell's webinar for the Association for Contemplative Mind in Higher Education, <http://vimeo.com/16330761>.