

LEVERAGING HIGHER EDUCATION'S ROLE IN SOCIAL EVOLUTION: A PARADIGMATIC STRATEGY

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Institutions can empower the human capacity to work through conflict and collaborate in solving complex problems by establishing structures designed to (1) support universal access to high-quality knowledge; (2) develop postformal reasoning, mature social competencies, and the disposition to exercise these capacities in service of the good; and (3) remove institutional barriers to such service. Higher education is a metasystem well positioned to help evolve such institutional structures if designed to do so. Five patterns of cross-disciplinary knowledge and an action agenda for such redesign can be understood by considering a retrospective narrative from an imagined future.

KEYWORDS: Action agenda, cross-disciplinary, higher education metasystem, postformal reasoning.

Higher education as it now functions in the global economy is a metasystem of disparate but tightly connected systems, not limited to colleges and universities. Its influence on knowledge and competence reaches into all aspects of modern society. As such, it is an institution well positioned to expand our capacity to create a livable future, if designed to do so. This article looks at some of the changes that would shift higher education away from its role as a source of social stratification and toward its potential as a source of social evolution and a means of social empowerment (see “Implications of Hierarchical Complexity for Social Stratification, Economics, and Education,” this issue). In it I sketch a framework for thinking about knowledge, access to knowledge, and understanding the disciplines that would partly realize the potential of higher education to provide, on a global basis, the multiple levels of support required for cultural progress (see “Cultural Progress is the Result of Developmental Level of Support,” this issue). My motivation is to show that such changes as envisioned here could assure universal access to high quality information and support people’s inspiration and expanded capacities to use that information collaboratively and effectively. The result I envision is that such co-constructed knowledge will undergird collective efforts to evolve society to create a livable future.

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The approach to exploring this possibility includes advocacy, discussion, story, and the introduction of a model and a proposal for action. I intend the story to be the primary vehicle in this article for integrating the other distinct sections of the article. In the space of this article, they serve as indicators, not full explications, of my thesis. The first section presents my rationale for asserting higher education as a leverage point for social evolution. The next section acknowledges perspectives that argue against the ability of higher education to change, and serves as the introduction to a story from an imagined future. As a narrative set in the year 2040, the story illustrates a process of higher education's evolution, and the role it could play in leveraging social evolution. The story is shaped by and presumes the cross-disciplinary model for knowledge integration that is introduced next. The final section proposes key elements for an action agenda for change in higher education.

The original impetus for developing this model and the larger set of recommendations from which this article is drawn, arose at Harvard University in the late 1960s. As I was earning my doctorate in philosophy and education, I designed and taught the first course there on higher education: "The University: Ideals in Conflict." I have continued to write and reflect on the purposes and future of higher education over a lifetime that has included many roles: teaching college in that and related fields, intervening in desegregation battles, working in technology, and serving for sixteen years as a state official for the California Community College system. In that system, I was responsible for training and oversight in new program development, curriculum design, staff development, and distance learning. All of these experiences inform the thesis of this article and the vision it proposes.

HIGHER EDUCATION AS LEVERAGE POINT FOR SOCIAL EVOLUTION

Societal metasytems, by the very nature of their reach, have potential to leverage significant social change. The needed transformation of higher education cannot be imposed. However, it could emerge in response to new technology, new social knowledge, and the planetary crisis of climate change. The power of higher education as a leverage point for social evolution derives from its inherent order of hierarchical complexity as a metasytem (see "Introduction to the Model of Hierarchical Complexity," this issue) and the tightly looped interactions of its key elements: (1) The set of institutions recognized by any given country as its system of tertiary or higher education; (2) A closely interconnected set of ancillary and oversight institutions, such as accrediting and funding bodies, professional associations, libraries, galleries, museums, institutes, and the agencies that oversee them, along with training programs, corporate "universities," corporations, and independent coaches and contractors; (3) Ongoing social networks and reputation economies that tie these entities together.

Higher education functions globally as an integrated whole, usually without regard to national borders, even though its components are often national systems. The *core functions* that define and delimit higher education are (a) authoritative

validation and management of fundamental knowledge for society as a whole, (b) knowledge selection, organization, and transmission for specific purposes, (c) the credentialing of professional levels of mastery and thus primary enforcer of acceptable understandings and practices of the professions, both formally and informally, and (d) the allocation of research funds and legitimization of published results. Its *derivative functions* further expand its impact, making it the primary (e) determinant of public school curricula and standards, (f) means for ushering youth into the adult world motivated and equipped to exercise leadership and social influence, (g) enabler of context for student connections, locally and at a distance, and hence of significant collegial relationships extending over a life time and across national boundaries, (h) locus of social and political ideas and movements, and (i) arbiter of authoritative public opinion.

Higher education, in effect, holds a virtual monopoly over the validated knowledge and recognized brainpower of society. I believe it is well positioned to do good on an unprecedented scale, equipping every willing citizen throughout the world with the higher-order thinking and social skills needed to solve problems and realize opportunities.

CHANGING HIGHER EDUCATION

A truism within the academy is that “you can’t change higher education.” Yet change it has, over the centuries, keeping pace with the evolving needs of society, and often in the lead. As it balances its duty to transmit culture with its duty to transform it, higher education responds in complex and often hidden ways to social needs. Its highly decentralized arrangement of tight relationships and weak links (Barabasi, 2002) makes it self-organizing, surprisingly coherent, and determinedly independent. Governmental agencies can fund and exert some control over institutions, but the metasytem as such is not under the direct governance of any body. Its autonomy is socially intended, keeping it sufficiently independent from politics and marketplace to deliver its indispensable work. That work is to (1) discover and tell the truth, (2) critique and seek the better way, and (3) teach each generation to think for itself.

Higher education holds itself accountable, not to the public, but to its *mission*. It does this through a set of interlocking forms of self-correction, formal and informal. Its reputation economy is among the most potent of these. Conscious allegiance to mission motivates its self-correction and coordinated action. I witnessed the effectiveness of a palpable sense of mission when I worked with the 45,000 faculty in the 108 California community colleges.

The interconnections of the systems and institutions that make up higher education create new capabilities, open the system to a wider range of influences, and incline it toward structural innovations (EU, 1997; COL, 2007). A new sense of mission, emerging from the confluence of diverse cultures and gaining focus around the planetary crisis, could tip the system toward the fundamental changes I propose as necessary. To be strategic about such efforts would significantly increase that potential (Palmer, 1992).

The story told in what follows can help envision how this could happen. It reflects conditions predicted by scientific scenarios based on the report of the Intergovernmental Panel on Climate Change (IPCC, 2007). The scenarios I selected place 2040 as the earliest point at which significant environmental impacts could conceivably have driven equally far-reaching social change, both good and bad. The story combines two IPCC scenarios at opposite extremes with the idea that although human correctives start slowly, once begun, they move fast.

SAN LORENZO BAY, 2040 AD

Ellen gazed dreamily out the window, her mind wandering from her early morning Systemics class at the new San Lorenzo Bay Institute. She'd been up way too late last night with her research group, a dozen classmates from Uganda, the Netherlands, and a half dozen other countries. She didn't know how the Africans and Europeans did it, talking for two class hours in the middle of the night, but she really loved having them in the class. She wondered if, on the other side of the planet, her fellow learners were also daydreaming their way through some class.

She stole a couple more minutes to quietly tap out a text message thanking Pieter. He'd had a lot of answers for their group last night. His island town in Denmark (Lolland, 2007) had been energy independent since 2007, using wave energy, an eco-city that was now a model everywhere. Before answering the question her team had just put out, she took a final glance at the sunlight playing off San Lorenzo Bay down below, wishing she were there. Not twenty years ago, when she was a young child, it had still been a river, though one that flooded so often insurance had been cancelled on all buildings in the tiny flood plain years before, and the levees had long since given out. The Institute's name was a mark of respect and an acceptance of the present reality.

The Institute was international, partly in person, partly online. Ellen loved it. At some point she'd be studying in either the Netherlands or Uganda with her classmates there. Her late group last night, today's work group, an hour's worth of video-clips, and tomorrow the weekly in person class with their faculty panel—altogether that was her Systemics core class. Two of the three faculty video-conferenced in: a physicist from Tilden and an agronomist from Uganda. Dr. Johnson, a meta-systemist from the Institute, lived on the grounds here and was usually there in person.

"I think we should go with Jan and Marta's graphic. They know the Complex best," Ian was saying. Ellen agreed, but with a loud sigh. She heartily wished "people processes" didn't always take so much time, especially when she was drowsy and the sun-bathed sea called out to her.

She was really far more interested in her research group's work last night on the Internet in their "Solutions Search." They'd added some twenty new ideas to the Global Solutions Exchange and she'd learned so much from them. Until recently, "go 2.0" was only a slogan to her, an unreachable dream, the way "ZPG," zero population growth, had once been. But two of her classmates lived in communities that had actually done it—pulling out of the air fully twice as much carbon as they would once have put into it. Though more common now, it was still a source of

great prestige to those towns that did it. The most popular way was to gather weeds, forest waste, or plant some crop that grew really big really fast with lots of refuse, bake the refuse into charcoal (Eprida, 2007), and then sequester that charcoal forever underground where it had an almost magical ability to turn infertile soil into rich farmland. It was a double miracle, actually, because as the seas had risen to cover most of the naturally arable deltas, the need to create newly fertile soil on hillsides or deserts had become a matter of life and death. Over a billion people had moved upland—after a half billion had died! The headlines never stopped, it had seemed, when she was a child. But it was finally starting to turn round.

Noticing her irritability, she made herself take a deep breath to be more fully present to Ian. She'd been taught how to do this in school as a child, and now again, it was a practicum in the "small human systems" section of her course. "Every human system begins with breath," Dr. Johnson kept saying and had assigned dozens of papers to prove it. "That's O.K.," Ellen thought, chuckling to herself at her favorite professor's nickname. "Best breath in the West." Funny now, but less than two decades ago "fastest gun in the West" was back in common usage, as gun fights had peaked at an all time, bloody high. It had turned so bad that the citizen-police councils in every neighborhood had gotten "up in arms," so to speak; well, "up in non-arms," actually. They'd demanded that every single child learn—to the point of demonstrable mastery—how to manage conflict. In the end, these new "basic social skills" as they were called had been rolled into a single interdisciplinary course everyone took every year, like language arts. Over the years it had included drama, music, martial arts, even math, and an especially tough semester on the "biology of conflict resolution," saying how the brain, the heart, and the nerves handled anger, and why the breath mattered.

In middle school they'd studied and tried out different rituals peoples from all over the world had invented to handle difficult situations. It had been fun, sometimes even awesome, to don costumes they'd made themselves and act out the solemn ceremonies. And they had worked together from kindergarten on, anyhow, learning teamwork, for sure, but every school had to be self-sustaining. That was actually the law now. Food, energy, water. It was up to the students to learn to do it all, for real. They gave to the neighbors and families, who helped out in return, but sustainability was a lesson so basic to survival, that "tool illiteracy" had come to be as unacceptable as any other form of missing the basics.

It had cut school costs. And so had getting rid of the senior year—after years of heated arguments. Subsidizing a Senior Experience had cost half as much, and opened up early college, apprenticeships and internships, travel, service anywhere. Drop out rates were almost nil. You could even start in your junior year, if you qualified.

Of course, the breakthrough had been making sure that earlier learning was really successful. Learning to Learn, an old methodology from the '90's, turned out to be the key (Heiman, 2007) And nowadays, teachers studied brains as thoroughly as doctors studied bodies, along with group dynamics and social epistemology. That helped. The only program harder to get into or get through than pre-teaching was pre-med. Teacher salaries were way up. It was hard to argue with the notion that in a world of wall-to-wall problems—and opportunities—the talents of everyone

really were needed. The whole thing was subsidized by the “prospective revenue” calculations that had become the norm for most governments. If you figured in taxes on wages, lowered demand for social services, and the growth in economies known to result from innovation and technical competence, schooling always had some of the best “Return on Investment” (ROI) around. Funny that people hadn’t realized the return on investment on education earlier, when the data on ROI had been right under their noses all along.

After class, Ellen headed directly home, anxious to get to the beach later. They finally had a tram connecting the campus to both San Lorenzo Bay and her new home in the “High Ground Complex,” built into the side of the mountain, for warmth, and now housing refugees like herself and her family. She could still remember the day, the third time in fact, that their home near Beach Fats had flooded out, only this time it happened so fast and was so high, nothing was saved, not even the favorite things that she had hidden in the attic for just such an eventuality. They’d barely escaped with their lives. But they had escaped, and now at last were secure again. She felt that her own mom’s work, and indeed some work of her own had helped made this all possible. After the years of discussion, the struggles for funding, the court fights, and the hard research into alternatives shaping up elsewhere in the world, they’d found a plan that worked. UCSC had agreed to give up land so long as the buildings were “buried” in the mountainside, greenery was on roofs and walls, and in fact everywhere so that the houses hardly showed up as houses, and local animals were not displaced. It was actually quite lovely, completely sustainable, and, best of all for her, high up, where the sea would never reach.

The solution for her family, and for half of Santa Cruz for that matter, hadn’t come easily. The years of desperation and work had slowly shifted attitudes as people were increasingly forced together by challenges they couldn’t handle alone. Nowadays things were so different from when her mom had been a girl. Then it was every person, every household, for itself. Now people shared—tools, food, water, rides. They had to. There just wasn’t as much to go around as there used to be. And people now made good use of every bit of space. Gone were grass lawns and dead roofs. Now gardens around and on top of houses, solar film on the sides (Solar Film, 2007), water catchments. Cooking outdoors in summer. Neighborhood meals often. Ellen was pretty sure that these things were a huge improvement on the past she’d heard so much about from her mom, a past of fast foods and fast cars, phones that only answering machines ever answered. Yards all fenced off and the whole outdoors considered too dangerous for children to play in. Thank heavens they’d found a way to restore enough of the ozone layer that children really could play outside once again without risk of skin cancer.

As a child, Ellen had listened fascinated by her mom’s every tale of daring do and had joined the cause herself just as soon as she was old enough. The planet was in jeopardy. Their own home, for sure, but everything else as well. Everything humans had managed to save in the last twenty years, was at that time still in grave danger—and her own mom, she knew, had been a part of what had turned it all around and rescued all that would otherwise have been lost, forever.

Even so, Ellen found herself sighing again. Sorrow for what had been lost was never too far behind her, even when she was celebrating all that had been achieved. Brave as her mom was, and as much as they had saved, she could not help but catch herself wishing, even angrily at times, or weeping, that they had not somehow done it all thirty years sooner, when the writing was first on the wall. If only the 1970s, with key efforts well started, could have been as steadfast as the 2010s! Then there might still be Monarch Butterflies in the trees near her campus as there once had been. “By the millions!” old timers would tell her. (“Rub it in why don’t you!” she sometimes wanted to shout at them. “Why didn’t you do something to save them!”) She had never even seen one, in real life, not one. Even though those millions that the old people got so excited about had wintered over less than a mile from where she was now walking. Could even the giant Redwoods make it now, without their afternoon fog? Would her grandchildren see them? Maybe any trees that lasted would be those able to exist without fog, a newly adapting species. Or, maybe humans would finally find some way to restore the fog, as they’d been trying to do for two decades now. Who knew?

What Ellen did know now was that she wanted to spend the rest of her life creating GUIDes and Community Knowledge Systems for people all over the world facing the same problems her town had faced. That’s why she’d decided to focus on “Open Source Solutions,” hoping to make her career in the field of Systemics. Now she was doing the real thing in college, and, through the global “Students Research Exchange,” actually contributing to knowledge. With tens of thousands of others around the world she sorted through the latest contributions to SolEx, the Solutions Exchange, finding patterns and creating rules of thumb. Together, they turned this barrage of information into knowledge tools and suggestions that ordinary folks could use. “Just in time learning,” indeed—just in time for the whole human race, she could only hope.

“GUIDes”—now there was an interesting tool. Not quite software, not a book, not a form, but a little of all of them. She’d first encountered the concept in this class and was anxious to try her hand at making one. “GUI,” of course, from the earliest days of the computer era, meant “graphic user interface.” In this case, the interface was designed not so much for navigation as to graphically convey key instructions and walk people through a process. A GUIDe could be a set of questions, a checklist, a schematic, a simulation, whatever got across the critical pieces so that people could use it on the spot, not unlike a cookbook. But there the resemblance ended, for this “cookbook on a stick” as someone had dubbed it, meaning a “data stick,” was two way, so that as people varied the “recipes,” pointed out problems with them, or suggested entirely different ones as substitutes, all that info went right back into the Exchange. Helping distill it would be Ellen’s work—and that’s what she wanted, good information out to where it was needed, and in time.

In her own town, for example, by the time they’d really gotten clear what was happening, it had been too late for a sea gate. The giant sea gates like the ones in Europe, one finally installed on the Mississippi Delta, and now the “Great Gate of San Francisco,” were for large deltas where millions of people lived. These sea gates were modeled shamelessly after the Dutch gate in Rotterdam (Spotts, 2007)

The Netherlands had been repaid for their foresight not only with survival—a big enough payoff—but were now one of the strongest economies in the world. Everyone wanted a piece of their technology.

But, Santa Cruz hadn't gone that route. Sea gates had to be built where the populations were huge, and governments and investors clearly had other places to put that kind of money. So now the town was kind of in three parts. What had been the downtown and tourist areas was the newly named "San Lorenzo Bay," an inlet where once had been the tiny San Lorenzo River with its little delta squeezed between low levies long since leveled. Higher up still stood all the houses that had been built on higher ground to begin with, only now surrounded by gardens, with second and third stories, and communal centers in every neighborhood. Finally, on the once sacrosanct university grounds were the tightly designed, 100 percent sustainable buildings that housed all who had moved, informally known as "the Complexes." Their energy needs were all supplied by the solar sheeting on the roofs and exposed surfaces. The University had opted for a different solution, since most of their buildings were tucked back under the trees. They did have some "solar fields," of course, banks of solar collectors out in the open, but their main source were the "wave generators" along the cliffs and sea walls (Wave Power, 2007). This area world famous for surfing still attracted its share of boards, but the waves now did double duty, carrying not only people, but energy.

Even though Santa Cruz itself hadn't benefited from a sea gate, their neighbors had, including Ellen's cousins who lived in Davis. Without San Francisco's "Great Gate," the whole of the Central Valley in California would by now have been as it had been eons ago, a vast inland sea, and she was grateful for it. But, boy had it been expensive! Insurance companies, investors, the Feds, everyone had gotten into the act. Ellen's great grandchildren would still be paying for it. But then, of course, her great grandnieces and nephews would still be able to live in that part of California, thanks to the Gate, so it seemed a fair enough proposition.

The real miracle in that great valley, though, was the land itself. Not only was it not under water but it was growing daily richer as the "terra preta" (Eprida, 2007) technology was changing everything. Daily trainloads of black carbon snaked through the mountains, coming up from LA through acres of windmills and carbon collection stations, bound for the Central Valley. (The trains themselves, "Soltrains" [Soltrain, 2007] they were called, were powered entirely by the sunlight beating down on their roofs, and on the "sol poles" that ran alongside the tracks.) Thousands of small farmers, CCC members, and eco-volunteers were out every weekend burying the charcoal in the earth, sequestering forever 40 times the carbon that had been released in harvesting that year's food—and guaranteeing millennia of fertility. Her own mom had been among those whose "study guides" explaining all these things, and used at conference presentations, teach-ins, sit-ins, neighborhood meetings, government and stockholder briefings, and stakeholder talks had spread the knowledge far enough to achieve the wide scale adoption of this technology that had since occurred.

The breakthroughs had occurred, her mom thought, because people really learned all the techniques they could for getting along—and used them—and because the rising seas were absolutely unforgiving. "Get along or die." Pretty

clear message, there. Real answers were not just about energy and ecology, her mom would say, preaching her favorite sermon, but about each other. It took every skill they'd been taught, but people really were getting better at doing justice. When desperation disappeared, so had most of the violence, it seemed. Oakland¹ had found it out first and become a Mecca for folks trying to solve people problems, a place where ordinary people had a role in running things—and got the tools, learning and respect needed to do the job. It changed things. (Mills, 1997)

Behind the scenes, Ellen knew, the university had actually had had a huge role. “Resilience studies” and “positive psychology” were now fundamental to good practice in most fields, its applications a basic skill required for graduation, and its theories required in graduate programs. It was amazing just how skilled people had become at all these things. Like reading, the “4th R,” “responsiveness,” now routinely taught had come to be taken so for granted, that it was a shock to find someone who was “socially illiterate.” “Robert’s Rules” still held where needed, but in most situations people had become just as familiar with “Roberta’s Rules” (Cochran, 2004) and used them most of the time.

The “Desperate Decade” had hit with unexpected swiftness around the beginning of the second decade of the new millennium. Not that people hadn’t been prophesying it for some time (Mayan Calendar Prophecy, 2012), but when it hit, no one was prepared. Suddenly water shortages were everywhere—except where they weren’t, and there it usually seemed to be floods instead. Hundreds of millions of people were on the move (Knickerbocker, 2007; Sappenfield, 2007). Deltas that weren’t flooded were, it seemed, becoming deserts. Food was in short supply. Urban centers were at a stand still; oil was so expensive, nothing could move. Crops went unplanted, unplowed, un-harvested. Thank heavens for students and faculty world round who set everything else aside to find solutions, fast. New water works following ancient models were built. School children side by side with adults planted billions of trees, wherever the water was to be found. Learning from Gaviotas, which had successfully brought back vast acres of indigenous forest, the Amazon was replanted, the river itself cleverly diverted to get the trees started anew. Many people died, but as many as could be were saved. Desperate measures were not just to survive, but to help others survive. Some strange shift occurred. The tribe was suddenly bigger. It was coterminous with the human race. Children e-mailing other children world round, MySpace, YouTube, gaming for real—the people across the planet might as well have lived across the street.

Ellen could still remember her shock when two of her “e-pals,” ones she’d known since she was a little kid, had been killed in the same year. One in a flood, the other from thirst. Not starvation. Not disease. Just plain thirst. “How can I get Kee some water?” was all she could think about for days. Ellen still had nightmares about those times.

It had changed so fast, even since her childhood, and the universities were responsive as maybe never before to the crisis facing all humanity.

Wasn’t that why she was here now? She still remembered just how big a role this university and all of its students and faculty had played in saving the entire area. In the town, and “on the ground,” everywhere, there’d been major battles and meetings and dialogues and struggles sorting it all out as old borders were

carefully erased and new maps drawn. Old property lines—now under water—had had to give way to those newly drawn, under a mandate that made the security of each and every person the first concern—even trumping “private property” for the first time in a long time, in fact in many millennia!

It wasn't really all that different at the University. Old “property lines” there had died as hard. Disciplines, long-splintered and increasingly upstaged by the speed of change and new knowledge, fought to maintain themselves, with fights over positions, course requirements, salaries and research priorities a daily occurrence. Her “systemics” course was a prime example. Now it was the backbone of the first two years of college for everyone, pretty much everywhere, but initially it had actually been ridiculed. In her university, “Mathematical Foundations of Systems” was taught throughout the first year—made actually fun by simulations, and the bright colored fractals her study group (Equals, 2007) had created together—a campus-wide contest for the loveliest, most “natural,” the simulation that taught the most. And then there were the “evolutionary landscapes,” peopled by avatars, where hard theory met game theory, and got played out between teams. By the second year they were all heavily into evolutionary ecology and social systems, agent-based systems, and moral philosophy.

Paralleling systemics, and building on it, was the year long, “History of the Cosmos” culminating in the geology of the earth, and the history of invertebrates, directly linked to the systemics course (Berry, 1999; Swimme, 1984). The second year picked up with the vertebrates and, along side it was taught the “History of Humanity,” and the geology/geography of the planet. All along the way they'd chosen particular species, regions, ecosystems, and cultures to go into more depth about. It would culminate in the third year with humanities courses, including a popular journal, her personal favorite, *Social Epistemology*.

Beyond that, Ellen was looking forward to the last two years her “world” to study project, some particular combination of physical, biological, social, economic, and technological system to understand. With her learning circle and mentor, with her from the start of college, she'd already been journaling and doing the Personal Practicum work, with stories, myths, art, and other “meaning makers” leading her toward an understanding of what her own strengths were, what she contributed to teams, what she needed from others—and how to communicate that. She'd take that self-knowledge into her “Special Systems Seminar” for the last two years, studying her chosen system(s) from both an academic and a practical side, learning how to understand systems, how to work with them, and when to intervene. Social Design came during the last year as well alongside, “Strategic Social Action” and “Deliberative Democracy.”

“Lord, what her parents wouldn't have given for such courses when they were in college!” Well, of course. They'd almost gotten themselves thrown out of college early in the process, trying to create programs like this. Gen Up (Gorman, 2007, pers. comm) was campaigning all around the country, and the world, insisting that as they, the “youth,” were about to “inherit” a near moribund planet and had to heal it, they should have a say, a big say, in what they studied. It's not like the older generation knew all that much more about how to deal with a situation no human being had ever encountered before. They wanted help from “the Elders,” but as

equal partners, co-creating together a university program in a form that could help their generation.

The planetary emergency that now could be neither denied nor escaped had scared everyone into trying new things. And the students in her mom's generation were by then very, very serious and had the support of a lot of adults. Together, elders and heirs, they'd envisioned what was needed—the skills, stories, images, and more. They'd come up with the courses and experiences most likely to teach these things. They'd even agreed on how students should be treated if they were to become competent and collaborative problem solvers who really cared for each other, about people on the other side of the planet, and for the "whole."

Ellen's program was no accident, then. It was about as intentional as something could get. Nor was it any accident that fully half her classmates lived half a world away, and were studying with her on the Internet. They'd been there for each other through difficult times. She longed to meet them someday, if ever the kite-driven ships (Piquepailee, 2005) and solar-winged planes (DiCaprio, 2007) started delivering on the cheap travel that inventors and investors had been promising for the past dozen years. Actually, fares were already a quarter of what they'd started at initially, so Ellen hoped to go after she'd gotten a job. By then, maybe travel would be all solar and fares cheap.

"Funny," she thought, her earlier sadness lifting. "I'll never entirely get over all the living things that are no longer here. Just the same, and hard as it's been, I wouldn't trade anything for being alive today. We really have turned some kind of corner; I know, I can feel it. And, I can feel right down to the ground how much my own life, along with the now 4.5 billion people still on this planet, is a part of the solution. What a privilege we all share. We did it. We turned it around. We've lost so much, but we've gained so much. After all the death, the disease, the destruction, we seem finally to be creating something we can all live with."

"We'll see."

A CROSS-DISCIPLINARY MODEL FOR KNOWLEDGE INTEGRATION

This section is a brief introduction to the cross-disciplinary model that undergirds the assumptions about a future higher education presented in the story.

The Power of Disciplines

A discipline is an object of formal study, with a coherent set of terms and its own defining history, seminal thinkers, texts or works, and methods. Each discipline offers a distinctive "lens" for viewing reality, with a particular way of organizing experience that highlights some aspects and brings them into focus, while ignoring or blurring others. Each discipline offers its characteristic questions, insights, and forms of rigor and the methodologies of each reveal truths and errors that would be missed without that method. Most situations, cases or works are that much better understood or appreciated as that many more disciplinary lenses are brought to it.

As we deal with increasing complexity and novelty, the focus of learning is shifting toward interactions between categories, and beyond them, and to syntheses of wholes. What is taught must also better comprehend the vast repertoire of human solutions to human problems and account for meaning and moral insight that have been grown in different traditions, and for species wide questions without precedent. We need ways to harvest human diversity and put it to use, even as we elicit a core of shared understanding adequate to the needs of a rapidly evolving world culture. In short, to deal with the future now coming, we need a curriculum that will:

1. Not only expose learners to a range of disciplines, but give them enough in depth experience of each of the main divisions of knowledge that they begin to “get it,” and do retain thereafter something of the rigor of distinctive perspectives even when the specifics of given studies have long since slipped from memory.
2. Offer a framework for handling the full range of disciplines and creating coherence among them. The current practice of exposure to each of the main divisions of knowledge remains necessary, but not sufficient. Students need a meta-discipline that offers a coherent account of the entire set of disciplines, systematically relates them to each other, contrasts their distinctive contributions, complementarities and interactions, and that points out the commonalities that cut across and unify them—all *without sacrificing the rigor of any one*. Where possible, this framework should help make sense of differences in cognitive stages of performance and different “styles” of learning and acting.
3. Explicitly teach the value and skills of interdisciplinary teamwork; that is, wherein each discipline contributes its distinctive understandings and terminology thus informing the practical questions of the moment without being merely reduced to its practical contributions. The process must work both ways: Experts able to explain their insights to those not familiar with their particular discipline, and able to hear from, and ask fruitful questions of, fields, both practical and academic, with which they have little familiarity.

The Power of Disciplines Coming Together

The “meta-knowledge” described earlier is the Metasystematic stage 12 capacity to see disciplines for what they are and use them consciously to expand and frame understandings. The core curriculum of higher education should show how the disciplines relate to each other, to research, to action, and to “reality.” It should also suggest what patterns of knowledge representation may be discerned as commonalities across the disciplines. The ability to recognize and effectively apply these general, high level patterns constitutes the “higher order” thinking usually associated with successful completion of schooling at the tertiary level.

The cross-disciplinary model is a means to that end. It identifies and organizes patterns common to all disciplines, and advances an epistemology that supports interdisciplinary, intercultural work. This epistemology, in brief, presupposes a unique and specific “object of study”—situation, product, performance, work of art, natural phenomenon, historical event, or interpersonal interaction—that can

never be fully encompassed by representation. Each mode of representation offers various and diverse ways of “knowing it,” and each revealing new insights of greater or lesser beauty or practical utility, depending on the need. Each form and each discipline, qua discipline, brings methodologies and rigorous criteria that force out error and misperception, insofar as that can be, relative to given purposes. The result of subjecting complex reality to the revealing simplifications of each of several disciplinary schemes is that that complexity becomes better understood. The model thus supports the development of postformal reasoning. This is because it, itself, requires postformal reasoning to teach it and to learn it: to coordinate disparate systems of knowledge patterns and their relations. Its use will require teaching people *how* to learn, and result in sustainable success for even the most poorly prepared (Heiman, 2007).

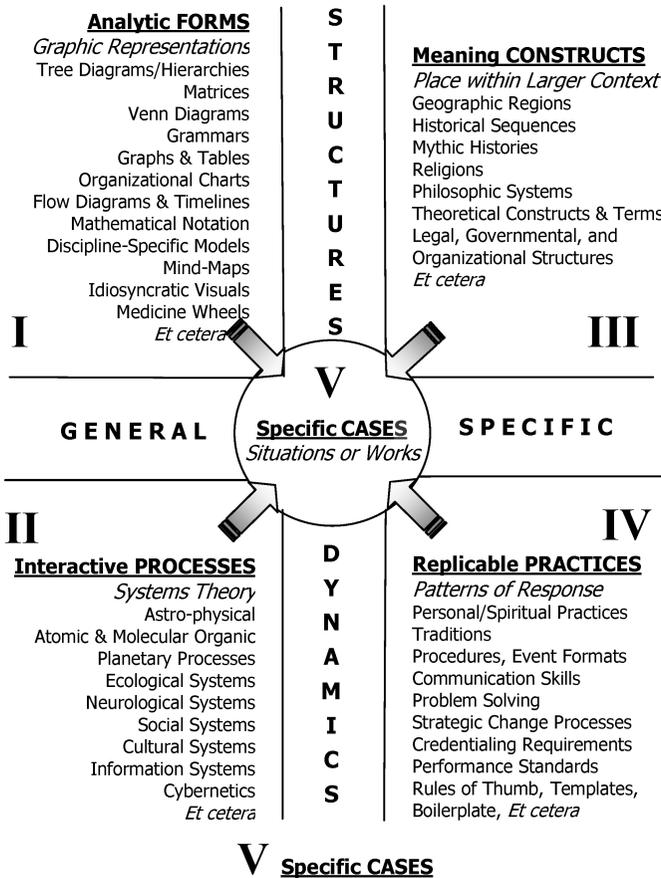
The Knowledge Mandala: A Cross-Disciplinary Model

The Knowledge Mandala (Figure 1) relates five patterns (Alexander, 1977) of knowledge representation in a metasytematic framework that supports the aforementioned recommendations. These five *forms of knowledge representation* are based on *patterns of knowledge making* that can be discerned in every discipline and cut across all of them, revealing their commonalities. Each form operates on demanding internal rules that remain the same regardless of the discipline.

A core curriculum can explicitly teach the disciplines *and* the representational forms they have in common, as multiple perspectives that students can apply to objects of study. An example may illustrate the point.

“Oh, Tannenbaum:” Applying the Knowledge Mandala’s Framework

Place a Christmas Tree at the center. Viewed from Type I, an analytic form, it can be schematized symbolically as a fractal, a dendritic crystal, a branching tree diagram. Type II, Dynamic Systems, can reveal or highlight the ecosystem from which it was taken, its own internal functions, and the evolution and characteristics of its species, Douglas Fir, all described in their dynamic interactions over time. (Its role as a commodity, an object of agriculture and commerce, rather than a “natural” phenomenon, and hence position within the dynamics of an economic system would be another Type II way of seeing it.) Viewed from the Type III perspective as a carrier of meaning, the Christmas Tree has a long, rich, and complex history as a fusion of pre-Christian Druidic culture, the winter light rites of many peoples, the Christian meanings of the birth of Christ, and contemporary Jewish meanings around Hanukah as a “reaction” to Christmas. Around the world, it is a quintessential symbol of the West and its adoption a conscious emulation of Western ways, with all that that means. It can be a symbol as well of materialism, the destruction of nature for mere profit, and the immanent end of all forests. And, for any given family, the tree and how it is handled (or not) is loaded with personal meanings, histories, and so on. Type IV representations would be instructions on how to successfully find or farm Douglas Firs as Christmas Trees, run a business selling trees, or just instructions in how to properly attach the stand, keep the tree



A given situation, incident, story, example, work of art, performance, scene, object, product, building, setting, entity, system, etc., subject to multiple, open-ended interpretations using knowledge patterns from the surrounding knowledge patterns and/or any other disciplinary, professional, positional or cultural "lens."

Figure 1. Knowledge Mandala: Model of Five Interdisciplinary Knowledge Patterns. Reprinted with permission. © 1999, 2007, 2008 by Nancy Glock-Grueneich.

watered, arrange the lights and ornaments, prevent fires, and dispose of the tree as the season ends.

THE REDESIGN OF HIGHER EDUCATION: AN ACTION AGENDA

Some changes to higher education presupposed in the 2040 story are listed here in the form of an agenda for action. The agenda's sixteen items are in categories of access, empowerment, curriculum, and institutions, elements developed in the story and sketched only briefly in what follows. Changes in mission and structure

are integral to this agenda, yet beyond the scope possible to include here (but see Glock-Grueneich, 2008).

Access

(1) *Solutions Exchange* (SolEx). Develop a global knowledge base of potential solutions to human challenges, in usable formats, easily retrieved at the point of use, open to feedback and continuously updated based on field experience. Develop local Community Knowledge Systems (CKS) with content management, social networking, and deliberative software. Base criteria for funding, philanthropy, research agendas, and professional practice on participation in and lessons distilled from these knowledge systems. (2) *Open Research Network*. Use findings from funded projects, student assignments, and open source volunteers, to develop content for the above, building it out from, for example, the Campus Compact network for service learning. (3) *University 2.0*. Build into the above knowledge base, open source curricula (Wikimedia, 2007). by which users can master a subject area, with help from online or local mentors and classmates. Develop a certification process that allows diplomas for demonstrated capacities, in established fields, where feasible. (4) *International Frameworks/Local Design*. For all fields with global reach, create international standards but only as frameworks or templates, the actual curricula to be built upon locally derived (even learner developed) examples, assignments, and guidelines. (5) *Two-Way Knowledge*. Widely distribute communication tools and protocols to encourage sharing individual perspectives, knowledge, and experience. Find acceptable arrangements for combining self-organizing, open source knowledge development with the validation and credibility of higher education.

Empowerment

(1) *Process Skills*. Teach within existing courses, or in specially designed courses, attitudes and skills that have proven effective in personal preparation for dealing with difficulty, community building, conflict resolution, collaborative problem solving, decision making, implementation, and systemic change. (2) *Knowledge Skills*. Build into these processes, in person and online, routine use of the knowledge bases described earlier to gain awareness of similar situations elsewhere and to find and assess alternative solutions. Teach collaborative forms of critical thinking. (3) *Deliberative Democracy*. Build into civics courses, professional education, and so on the expectation of and protocols for a society of citizens, producers, and consumers able to collaborate effectively in decision making and co-design, who use the aforementioned skills at least as well and as routinely as they now do standard hearings, elections, and business meetings. (4) *Schooling Experience*. Design instructional methodologies and campus protocols to amplify experiences wherein individuals hold themselves accountable and feel able to contribute, and groups develop mutual trust, concern for each other's needs and the good of the whole, share effort, and come to appreciate each others viewpoints and contributions.

Curriculum

(1) *Relevance to Future*. Rethink the mission, and infuse courses with new content that focuses attention on the planetary challenges and potential; the assets we bring to those challenges; solutions that exist already; and concepts drawn from this list. Teach the necessary skills and understandings, both across the curriculum and in dedicated courses. (2) *Partnerships*. Partner with students and youth, the heirs to our planetary challenges, to identify the knowledge and experiences they'll need, co-design curricula and learning experiences, and get them widely used. (3) *Reframing*. Examine meanings presupposed in or associated with disciplines to encourage integration and meaning, promote hope, where merited, and elicit a sense of higher purpose (Barlow, 1997; Dowd, 2007). Develop rigorous bases for knowledge integration and interdisciplinary collaboration (see next section). (4) *Media*. Expand use of software media, representations, arts, experiences, and assignments to tap the full array of modern communications and postmodern talents and expectations. Use social software to develop and support life-long collegiality, social networks, and cross-world relationships. Embed in the design of applications software and online systems the core knowledge of the disciplines, cutting edge concepts, and the values and conduct desired. (5) *Leadership/Entrepreneurship*. In career preparation, focus at least as much on assessing a situation and acting on its possibilities, as upon fitting into existing job slots. Build into the general curriculum concepts and skills now restricted to business and related programs, such as project management.

Institutions

(1) *Mission*. Build into the mission explicit commitment to enabling the capacity to create a livable future, however worded, including in particular the capacity not only to think critically, but to put knowledge in service of collaborative problem solving and deliberative democracy. Incorporate into consequent program design, the roles, attitudes, knowledge, and skills derived from this list and the many initiatives already underway that embody similar principles. (2) *Restructuring*. Rework scheduling, workload, and rewards to make innovative teaching, curricula and faculty collaboration (e.g., team teaching, service learning, block courses, learning communities) as feasible to undertake as classes in the current academic calendars and schedules. Optimize use of hybrid courses (combining online with on-site) and non-residential degree programs to maximize access to knowledge and credentialing.

CONCLUSION

This article suggests the potential of higher education to expand our capacity for postformal thinking and support the evolution of society. Working closely with the open source movement, as "University 2.0" (Glock-Gruneich, 2008), and using the new social spaces of the Internet, it could provide universal access to essential knowledge and help make sense of that knowledge. Changes to its curriculum and some of its processes could strengthen the analytic and interpersonal skills of

citizens, redirect priorities in the professions, and transform our understanding of the world. To realize this potential for leveraging social evolution, some changes are needed in higher education. These changes are within reach, if we work with its dynamic components to leverage forces already in motion. The starting point is to re-conceive the mission of higher education to recognize in it the means by which coming generations gain the capacities they need to create a livable future.

NOTE

1. In Coliseum Gardens, a two hundred-unit public housing project, described as “so dangerous fire engines would not enter without a police escort,” with “the highest rates of homicide and drug-related arrests in the city of Oakland, California,” community police and community leaders were trained in a resiliency-based human services program supported by Santa Clara County. After two years, homicides had “dropped by 100 percent” (Mills, 1997) and after five years, no further homicides had occurred, a total of five years at last report (R. Mills, pers. comm.)

REFERENCES

- Alexander, C. 1977. *A pattern language: Towns, buildings, construction*. New York: Oxford University Press. www.patternlanguage.com (Accessed 12 December 2007.)
- Barabasi, A. 2002. *Linked*. Cambridge: Perseus.
- Barlow, C. 1997. *Green space, green time*. New York: Springer-Verlag.
- Berry, T. 1999. *The great work: Our way into the future*. New York: Bell Tower/Random House.
- Cochran, A. C. 2004. *Roberta's rules of order*. San Francisco: Jossey-Bass.
- COL. 2007. The commonwealth of learning, an agency of the Commonwealth. www.col.org (Accessed December 2007.)
- DiCaprio, L. 2007. *The 11th hour* (movie). www.11thhouraction.com (Accessed 12 December 2007.)
- Dowd, M. 2007. *Thank God for evolution*. Tulsa, Oklahoma: Council Oak Books, LLC. <http://thankgodforevolution.com/> (Accessed 17 December 2007.)
- European Union. 1997. The Convention on the recognition of qualifications concerning higher education in the European region 1997.
- Eprida. 2007. www.eprida.com; <http://www.eprida.com/eprida.flash.php4> (Accessed 12 December 2007.)
- Equals. 2007. *About Equals. Equals project at Lawrence Hall of Science*. <http://www.lawrencehallofscience.org/equals/workshops.html> (Accessed 12 December 2007.)
- Glock-Grueneich, N. 2008. University 2.0: Informing Our Collective Intelligence. In *Collective Intelligence: Creating a Prosperous World at Peace*. Oakton, VA: Earth Intelligence Network.
- Gorman, J. 2007. <http://www.kosmosjournal.org/kjo/backissue/f2007/generation-waking-up.shtml>, <http://www.focusthenation.org/> (Accessed December 2007.)
- Heiman, M. 2007. 1969. *Learning to learn*. Somerville, MA. Learning to Learn. www.learningtolearn.com (Accessed 12 December 2007.)
- International Panel on Climate Change. 2007. International panel on climate change: Summary for policymakers. In *Climate change 2007: The physical science basis. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change*, Eds. Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M.,

- Averyt, K. B., Tignor, M., and Miller, H. L. New York and United Kingdom: Cambridge University Press, p. 18. <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf> (Accessed 12 December 2007.)
- Knickerbocker, B. 2007. Global warming may uproot millions. *Christian Science Monitor*, June 21. <http://www.csmonitor.com/2007/0621/p10s01-wogi.html>.
- Lolland, Denmark. 2007. First Danish hydrogen energy plant is operational BASS *Baltic Sea Solutions*. <http://www.bass.nu/en/index.php?mod = main&top = 0&parent = 0&id = 69> (Accessed 12 December 2007.)
- Mayan Calendar Prophecy. 2012. <http://www.13moon.com/prophecy%20page.htm> (Accessed 12 December 2007.)
- Mills, R. 1997. Comprehensive health realization community empowerment projects: List of completed and current projects. Unpublished manuscript. <http://mentalhealth.samhsa.gov/schoolviolence/part2chp2.asp> (Accessed 17 December 2007.) See also http://en.wikipedia.org/wiki/Health_realization
- Palmer, P. 1992. Divided no more. *Change Magazine* 24(2): 10–17. <http://www.mcli.dist.maricopa.edu/fsd/afc99/articles/divided.html> (Accessed 10 December 2007.)
- Piquepaille, R. 2005. Are wind-assisted ships in our future? *Roland Piquepaille's Technology Trends*. <http://www.primidi.com/2005/03/07.html> (Accessed 12 December 2007.)
- Sappenfield, Mark. 2007. Global warming may heat up conflicts too. *Christian Science Monitor*, December 6. <http://www.csmonitor.com/2007/1206/p13s02-wogi.html?page = 1>
- Solar Film. 2007. Solar Film. *The Osgood File (CBS Radio Network)*: 8/28/02. www.acfnewsources.org/science/solar_film.html, www.treehugger.com/files/2006/08/nanosolar_print.php, www.treehugger.com/files/2007/04/worlds_largest_5.php (Accessed 17 December 2007.)
- Soltrain. 2007. <http://www.soltrain.itgo.com/> (Accessed 17 December 2007.)
- Spotts, Peter N. 2007. How to fight a rising sea. *Christian Science Monitor*, 15 November. <http://www.csmonitor.com/2007/1115/p13s02-wogi.html#>.
- Swimme, B. 1984. *The universe is a green dragon*. Rochester, VT: Bear & Company.
- Wave Power. 2007. http://en.wikipedia.org/wiki/Wave_power (Accessed 17 December 2007.)
- Wikimedia. 2007. www.wikimedia.com (Accessed December 2007.)