

“Tomorrow will show that at least some of what we take as impossible is indeed possible; it’s just that the particular way has not yet been found.”

**Ellen J. Langer
On becoming an artist**

**The Empty Cup
(Power Teaching in a Digital Age)**

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Abstract

What might count as a world class, national public education system in 2020? That empty cup took the floor at the 2010 Future of Learning (FoL) Summer Institute at Harvard University. It traveled from Longfellow Hall's lecture room on Appian Way to several learning groups scattered around campus. Though not deliberately created to think about world class schools tomorrow, interaction amongst speakers, facilitators, and educators from across the United States and 26 other countries as well as ongoing reflection built into the institute all assured that deep thinking about education tomorrow would take place. The institute aimed at putting ideas into action once back home. Thus, as an emergent property of FoL, the power teaching prototype suggested three factors that might frame education at Edward Waters College (EWC) in Jacksonville, Florida. Vision became action. Put simply in a mathematical metaphor, $P=fm/c$ {where P = power teaching; f = future of learning with four levels (teaching for understanding, information literacy, Howard Gardner's five minds for the future, David Perkins's learning by wholes), m = Ellen Langer's mindfulness theory, and c = context (mind brain education and consciousness based education)}. These factors allow educators to design, deliver and assess instruction in K-16 settings. Finally, the model case featured in this occasional paper is a Tests and Measurements course at Edward Waters College, Jacksonville, Florida. Thus, the paper offers chances to "think locally" and "wonder globally."

Introduction

A Ph. D. student in world religion visited a Monk famous for his knowledge of the Tao. As the monk prepared tea, the student went on and on about e-books, peer reviewed articles, DVDs, Youtube videos, Internet searches... on Taoism. The monk kept pouring tea.

"Stop," said the student. "Can't you see? The cup is overflowing."

"You are like this cup, replied the monk. "So full, I can teach you nothing."

The moral of this story is become an empty cup.

As "Blueprint for Reform: Reauthorization of the Elementary and Secondary Schools Act" asserts: our nation needs to create a world class public school system by 2020. The five component plan maps the problem, but the empty cup remains. What might count as a world class, national public education system in 2020?

That question took the floor at the 2010 Future of Learning (FoL) Summer Institute at Harvard University and traveled from Longfellow Hall's lecture room on Appian Way to several learning groups scattered in buildings around campus. Though not deliberately created to think about world class schools tomorrow, interaction amongst plenary session speakers, mini course facilitators, learning groups, readings, discussions with educators from across the United States and 26 other countries as well as ongoing reflection built into the institute--all assured deep thinking.

While individual schools and even districts might be described as "world class" our national public school system has not yet reached that status. But educators can recognize the content of the cup itself. One set of suggestions for that content is stated in the power teaching prototype. Put simply as a mathematical metaphor, $P=fm/c$ {where P = power teaching; f = future of learning with four levels (teaching for understanding, information literacy, Howard Gardner's five minds for the future, David Perkins's learning by wholes), m = Ellen Langer's mindfulness theory, and c = context (mind brain education and consciousness based education)}. These factors allow educators to design, deliver and assess instruction in K-16 settings. The model case featured in this occasional paper is a Tests and Measurements course at Edward Waters College, Jacksonville, Florida.

Future thinking

“We must prepare for change, said Santiago.”

Paulo Coelho

The Alchemist

Millet and Staley argue that the futurist field lacks a coherent philosophy, and they suggest three questions that might serve as steps towards creating such a framework to inform our thinking about tomorrow: (1) “Does the future exist?” (2) “Can we know and speak about the future?” (3) “What is the purpose of future thinking?” These questions can apply to thinking about schools.

Unlike other professions, the authors argue that the futurist field has been fragmented primarily because of an incoherent philosophy. As a result, graduate programs in future studies are few in number; wide spread accreditation for futurists does not exist; nor does sustained professional development. But true to Ellen Langer’s assertion in *Counter Clockwise* about the “psychology of possibility,” their proposed questions serve as a starting block for the field. As the millennium unfolds, all the field lacks now may be created.

Millet and Staley define the future as that which comes after the past. So in that sense the future is always only a possibility and never a fact. President Obama’s “Blueprint for Reform...” is a possibility. We know what world class schools and districts look like. We don’t know how to create a national world class public education system by 2020. We know that it is possible.

As Millet and Staley suggest, we can envision tomorrow—though (Idiatulan elsewhere argues that only God has a perfect view of the future. In his view, humans can increase consciousness and, thus, glimpse tomorrow on occasions.) But to the point of Millet and Staley, our prefrontal lobes are designed to imagine possibilities not yet real. That enables us to speak about the future in terms of forecasts, trends, scenarios, and more. So in that sense, a national world class education system can be imagined. A president from another time once said, “Put a man on the moon by the end of the decade.” In 1969, Neil Armstrong took “one small step for man and one giant step for humankind.” The possibility envisioned in 1960 became the reality.

Finally, the authors pose this: “What is the purpose of future thinking?” Millet and Staley claim that people can prepare for the future. Indeed the value of thinking about tomorrow is this: envisioning possibilities helps us work toward the future we want.

In another context Duane Elgin, Lester Brown, Al Gore and many others tell us that the convergence of systems level global problems without national borders place before humankind a choice the species has never encountered in 195,000 years of life on “Spaceship Earth.” In Elgin’s language, humans can experience an “evolutionary crash” or “evolutionary bounce.” We can continue a path of global gluttony. Or we can create a path of voluntary simplicity, individually and collectively. Elgin argues that we can choose the scenario best suited for tomorrow.

Applied to thinking about the future of schools, we can choose to create a national world class education system in the United States and lead the way toward a global world class education system. We can choose to explicitly envision ways education creates a pattern that connects the development of intelligence and the evolution of Homo sapiens. Far ahead, we can see Peter Ward’s “Homo futuris” (a new species of humans replacing Homo sapiens the way Homo sapiens replaced Homo erectus).

However, in creating the content for the cup of a world class, public education system--a smaller scale--it is possible to draw on a fistful of ideas synthesized in the power teaching prototype and applied to a model case course at one college. As math professors Burger and Starbird say, "think locally; wonder globally." Thinking about one future bent class as a fractal helps to wonder about a whole college, a whole system, a whole world.

Power Teaching

“All education springs from some image of the future.”

Alvin Toffler

Teaching for Understanding

Millet and Staley point out that thinking about the future can be rooted in the past. It is possible to see historical trends and project a continuation in the near future. That is the heart of the content analysis approach John Naisbitt used to create his landmark book *Megatrends*. Most, if not all, of his original ten megatrends were late 20th century events, including the most significant of the trends—shifting from the Industrial Society to the Information Society. However, some trends in education have roots since the days Homo sapiens co-existed with Homo erectus.

Teaching for understanding, for example, included a father teaching his son how to hunt large and small game with tools. Understanding meant the son could spear a Woolly Mammoth or a rabbit. A photo exhibit in the hallway of Mayo Clinic, Jacksonville, Florida illustrated a present version of this trend. “Moagana carried Kwanbr on his shoulders and taught his son everything he needed to know until he was bitten by a fer-de-lance while hunting and died in the forest.” A photograph of Moagana stood above the caption. Two photos over, National Geographic’s Loren McIntyre captured Kwanbr. He would replace his father as an Amazon headman.

About 10,000 years ago when the agrarian age emerged along the Nile River and complimented hunting and gathering, a stable population invented apprenticeships. Studying with a master artisan offered another way of teaching for understanding. In their book on the digital revolution, Collins and Halverson implied that apprenticeship was the most successful model of teaching for understanding for centuries until Horace Mann and others invented public education in Massachusetts 200 years or so ago.

But unlike apprenticeship, which kept teaching for understanding relatively pure, public education in our nation fractured into a two-tiered system of education. Teaching for understanding took a twist. On the one hand, a few students experienced the historical trend of teaching for understanding akin to apprenticeship. The most gifted students were taught well. On the other hand, many other students were educated for the factory floor or the military field. They were taught to recall and obey.

Witness our nation's capital. Shortly after its city charter early in the 19th Century, Washington, D.C. created a public school system for white children only. After the civil war it created a separate but far from equal system for black children. Like something out of Dickens, a little more than one hundred years later, two or three of the high schools in D.C. stood among the best in the nation. Many of its other high schools stood among the worst. A fractal, echoing self-similarity during the Industrial Society, the elite/non elite pattern was repeated: academically selective magnet schools and advanced placement classes or gifted programs within schools. So, primarily, the elite engaged an education that might have been geared toward deep disciplinary understanding. The non elite population in DC and elsewhere got an education that might have been designed to fill low knowledge jobs in the labor force, the infantries or even to stuff the criminal justice system.

During the Industrial Society, such a pattern of public education worked well. Only a few needed to be prepared to sustain economic output. But as Thomas Freidman, Collins and Halverson, Vito Perrone and others, argue, in an Information Society, such a pattern is unsustainable.

President Obama's "Blueprint for Reform..." says our nation has fallen behind many other developed nations who are competing for good ideas in a knowledge age. The "elite-only" approach no longer works. We need a mass national system that fosters teaching for understanding from K to 16. That may not eliminate the elite/non elite pattern. But as Harvard historian Vito Perrone once said, we need a "pedagogy" of teaching for understanding—one that can become more widely distributed across ability groups and zip codes. Such a possibility for mindful teaching and learning is already here.

About 20 years ago, Harvard University's Project Zero (PZ) Research Center began developing the teaching for understanding (TfU) framework in collaboration with teachers in real world settings. The Ivory Tower met the chalkboard over pizza and coke to create a framework for designing performance based instruction. And for the last 16 years, 250 or so educators from around the world each summer have gathered at Harvard Graduate School of Education for an intense, week-long "Views on Understanding" Summer Institute plus an army of other educators taking online courses in Harvard's World Wide Web. The teaching for understanding framework has been spreading exponentially, making it possible to create high quality instruction for many.

Charles Reigeluth's compendium on new paradigm instructional design theories says that TfU frames instruction and Howard Gardner's MI approach (based on his landmark multiple intelligences theory) organizes the delivery of individual classes or even whole projects as in the case of a Tests and Measurements course at Edward Waters College. TfU designs. The MI approach delivers. Both can design and deliver teaching for understanding now and in the decade to come.

Information Literacy

Information Literacy serves as the next level in the future of learning factor. On the surface, the term appears rooted in the 1989 Presidential Report from the American Libraries Association. The report said information literate people could locate, evaluate, and create information. But more broadly speaking, many civilizations, since the Agrarian age had a few people who could read, do numbers, and write, using the technology of the times to share knowledge.

In the last years of the 20th Century (post Netscape's 1993 introduction of publically available Internet), it became evident that masses of people needed to become information literate, however. Yet, in the eyes of Collins and Halverson, many schools had been resisting the development of students who can find facts in digital space and create new connections. No matter, the trend toward developing information literate people is still upon us and will be with us in the decade to come as the digital age unfolds. The nation needs people who can locate, evaluate and create information, particularly in the STEM areas, the arts and beyond. Information literacy has a place in the classroom of today and the cup of tomorrow.

Five Minds for the Future

Howard Gardner first shared a chapter from his *book Five minds for the future* with 250 participants gathered in the lecture room of Longfellow Hall, home of Harvard Graduate School of Education. The year was 2005. At one of the plenary sessions for “Views of Understanding,” Gardner offered a new direction in education that might increase in value as tomorrow unfolds. His quintet of minds for the future already has a place as a framework for assessment of disciplinary understanding in the model case, future bent college class in Jacksonville, Florida. It already is hard to imagine how a world-class public education system could not develop disciplinary minds, synthesizing minds, creating minds, respectful minds and ethical minds.

When Gardner took the stage and presented the opening plenary at Harvard’s 2010 Future of Learning Summer Institute, he offered the packed house of participants up to the minute arguments about the value of five minds for the future. He said the five minds are claims about policy in a world in which lifelong learning is essential. People can reflect on their own learning without age limits. Then, he summarized the five minds.

Disciplined mind is first: working steadily to improve, learning major ways of thinking, becoming an expert in a profession. He added that disciplines are not natural ways of thinking—e.g. scientific or historical or mathematical require special preparation; they offer characteristics ways of creating knowledge. Gardner said we need experts for new jobs today and tomorrow, but people must continue to learn. As cited in Cynthia Wagner’s article in the January 2011 issue of *The Futurist*, “many functions will be more automated in the future, including professional services, but people will still find creative ways of using their skills and talents to make a living. The embodiment of life-long learners, these future workers will retrofit (add new skills and knowledge to existing jobs); blend (combine “skills and functions from different jobs or industries to create new specialties”); and, problem solve (“...the supply of future problems for people to solve seems limitless”).

Synthesizing mind is next: Darwin embodied the synthesizing mind. According to Gardner, such a mind samples, takes stock, processes, keeps track and most of all connects ideas. A back issue of *The Futurist* cited “synthesizer” as a new job for the 21st Century. Note that Wagner’s recent article in *The Futurist* cites 70 jobs for 2030; each appears to require both the disciplinary mind and synthesizing mind.

Creating mind follows. This mind requires people to not only create new ideas but to make new mistakes as a valuable part of the creative process. Wagner’s “Space junk recycler,” “Exobotanist” and “Astro psychologist” might engage the creative mind. Gardner said the first three minds (discipline, synthesizing, creating) can be reframed in terms of “depth, breath, and stretch.”

The respectful and ethical minds are more on the equally valuable social side. In a world of high immigration, respecting people different from self is critical in the workplace, school, and neighborhood. As a rule, the ethical mind requires treating well the people you see every day. Though difficult to achieve, solutions to ethical problems advance the interest of others. In brief, Gardner said the “three Es of good works are excellence, ethics, engagement. Imagine Wagner’s “Global system architect” and “Environmental health nurse” as engaging respectful and ethical minds.

In closing, Gardner asked the crowd of FoL participants this: “how do we think about the five minds in a digital age?” Within the context of the power teaching prototype as it has been used for reinventing college courses, Howard Gardner’s pentad of minds for the future add value as an assessment framework. They are worth teaching and make teaching worthwhile. They add value to the cup for a world class public education system in 2020.

Learning by wholes

Perhaps the most hidden idea at Harvard's Future of Learning 2010 Summer Institute was David Perkins's learning by wholes, a new theory of teaching and learning. His plenary talk on teaching for the known and unknown hinted at a revolution in education that "won't be televised" (as the Last Poets once exclaimed). Yet, a close reading of his book made it clear that the seven principles of learning by wholes had to be part of any discussion about the future of learning. His plenary talk about connecting the known to the unknown was like the image Kenneth Koch gives in his poem: one train passes, wait before crossing. There might be another train hidden by the first. Or as Koch says later in the poem, wait to see all the sisters before deciding which one to date. David Perkins's talk hid the book.

Using "game" as a metaphor, Perkins says teachers might consider helping students to engage the whole discipline under study. Sometimes that might mean giving novice students a "junior game" to gain access to core disciplinary ideas. Students in the fall Tests and Measurements course at Edward Waters College, for example, engaged the Langer Mindfulness Scale, a psychological scale designed to measure the trait of mindfulness in contrast to the state. In data analysis workshops, they played around with organizing data and finding range, mode, median and mean. They compared the class mean to Langer's norm group mean and standard deviation. They compared an individual score to the norm group and the class means. They created inferences and drew conclusions from the data.

Such engagement enabled them to work on three other principles in the Perkins theory of teaching and learning: (1) make the game worth playing; (2) work on the hard parts; (3) uncover the hidden game. By using their individual and class data as a springboard, the students made the game worth playing. Motivation to encounter reliability and validity

concepts increased. Studying the way Langer and her research team dealt with issues of reliability and validity to construct the scale served as “working on the hard parts” as well as “uncovering the hidden game.”

Finally, for the entire semester, students utilized strategies for thinking and writing including Robert Marzano’s research based strategy for summarizing and note taking. With “writing to learn” and writing to demonstrate learning strategies generously featured, students played Perkins’s game of “learning how to learn.”

In summary, the future of learning factor has four levels: teaching for understanding, information literacy, five minds for the future, and learning by wholes. Considered side by side with other documents such as the *2020 Forecast: Creating the Future of Learning* (KnowledgeWorks Foundation and Institute of the Future, 2008), the future of learning factor of the power teaching prototype provides a way of seeing the material for a world class, public education system in our nation. We know how to make the cup.

Mindfulness Theory

Another factor in the power teaching prototype with a history suggests a possible purpose of education. For three decades, Ellen Langer has been developing mindfulness theory. A social psychologist at Harvard University, Langer's 11 books and greater than 200 articles describe numerous studies and observations about how people might (1) welcome new information, (2) hold more than one perspective, (3) create new categories, (4) reframe situations, (5) see both context and process, (6) notice the familiar and the novel. Additionally, her psychological measurement of the construct "mindfulness" offers four factors: novelty seeking, novelty producing, engagement and flexibility. So the theory and the instrument side by side provide a research based purpose and a measurement of mindfulness as a psychological trait akin to several other theoretical ideas about teachable intelligence (Gardner, 1983, Sternberg 1985, Langer, 1989, Perkins, 1995 and mind brain education emerging).

Most recently, in a televised interview, Langer said her three decades of research on mindfulness and mindlessness can be said simply, "see the new." Noticing the new keeps the mind engaging all levels of mindfulness such as context and perspectives or welcoming new ideas. Noticing the new enables one to draw on Langer's operational definition of mindfulness in the LMS in terms of its four factors and create conceptual definitions for mindful teaching and mindful leaning.

Mindful teaching generates instruction that fosters novelty producing and seeking, flexibility and engagement. Likewise, mindful learning demonstrates novelty producing and seeking, flexibility and engagement. In a digital age, the border between teacher and student might be as permeable as a membrane. Both can be learners. Both can be teachers. Both need to be mindful.

Finally, noticing the new means a single, but deep, purpose for K-16 education in a digital age can be reframed as follows. **Develop mindful learners.**

Context

Such a set of factors with a near term likelihood, as described so far, can be expressed in a mathematical metaphor: $P=fm$ (the power teaching prototype where P = power teaching, f= future of education with three levels and m=mindfulness theory. (See Fluellen, 2010a.) Add to these the c-factor for context. Two streams from the same ocean characterize context. Fisher et al point out that education, biology and cognitive science have combined into a new field of psychology and, thus, a new direction in research about learning. In fact, according to Fisher, mind brain education aims at connecting research about learning and actual practice in classrooms. Concurrently, the movement of Maharishi Mahesh Yogi has coined the phrase “consciousness based education” to describe research based mind brain discoveries in relationship to transcendental meditation and human capacities including classroom performances. They both draw from research-based ideas about the mind and brain. But consciousness based education adds explicit development of human capacities to the mix. The two streams converge in power teaching.

Future Bent Education

“Think locally. Wonder globally.”

Starbird and Burger

As Paulo Freire’s critical pedagogy asserts theory and practice go hand in hand. The power teaching prototype is nothing without application to real students in real time. A practical application need not experience “wait time” like the ideas in Kenneth Koch’s “Two trains” poem. One train did not hide another when it came to testing the prototype. A future bent, Tests and Measurements course at Edward Waters College, fall 2010, connected the dots among the power teaching factors with real students. More so, reinventing psychology courses at Edward Waters College with the power teaching framework took root in six years of development that began with Superintendent’s literacy coach work in Washington, D. C., 2004. Collaborations with educators in the District of Columbia Public Schools and Howard University (including the District of Columbia Area Writing Project) led to eight documents in an occasional paper series published internationally by the Education Resources Information Center (ERIC). The papers narrate development of the prototype. Presently, this fourth generation model for teaching and learning can be used to design, deliver and assess instruction in a number of writing/thinking intensive psychology courses at Edward Waters College now and in the decade to come. However, for the sake of illustration, the power teaching prototype describes one future bent, writing/thinking intensive Tests and Measurements psychology course.

Edward Waters College

Originally created in 1866 to educate former slaves, Edward Waters College (EWC) is a short stroll from downtown Jacksonville, Florida. With less than 1,000 students, the college is a small, private institution of higher education. EWC walks softly but carries a big vision.

Edward Waters College will become a national model for a dynamic, globally-diverse learning-centered community that champions academic excellence through innovative teaching and learning strategies under-girded by a spirit of servant leadership.

Thus, reinventing EWC psychology courses to be future bent, writing/thinking intensive offerings with an explicit framework for the design, delivery and assessment of instruction puts the vision into action. As MIT Professor Peter Senge might say from the perspective of his fifth discipline framework, vision describes the gap between the desired state and the reality. Edward Waters College wants to be a national model for innovative instruction. At present it is not. But several faculty, students and administrators are working to make it so.

For example, the Tests and Measurements (PsY360) syllabus for fall 2010 featured Harvard Project Zero Research Center's Teaching for Understanding (TfU) framework as its course design. That meant five core ideas of TfU organized the plan: (1) generative topic, (2) throughline, (3) understanding goals, (4) understanding performances and (5) ongoing assessments. That meant the design fostered performances of understanding in which students would show what they knew and build new understandings" as Tina Blythe, author of the landmark book *Teaching for Understanding*, would say.

TfU framework

Generative Topic

With TfU as the framework for course design, the “generative topic” was “What counts?” This topic focused the interest of both the students and the professor. It boiled down core ideas about psychological and educational tests to a bumper sticker.

Throughline

Peter Senge’s idea from *Presence* synthesized almost a century of constructivist thought (from Dewey to Piaget to Vygotsky to Friere to Bruner to Hilliard to Sternberg et al). “All learning integrates thinking and doing.” That became the course “throughline,” an idea or set of ideas repeated, strategically, over and over all course long. For instance, throughlines at Harvard’s FoL were as follows.

Throughlines	Sidebars
1. <i>What do we know?</i>	What do we know about globalization, the digital revolution, and the human mind and their influences on learning and education?
2. <i>How might we rethink learning?</i>	How do we rethink the what, who and how of learning as a result of these changes or forces?
3. <i>What should we do?</i>	What should I and others do differently to meet the demands of the future of learning in practice?
4. <i>What will these changes lead to?</i>	What consequences may such educational changes have for learners and societies? What is our role as responsible 21 st century educators?

The Senge throughline in the EWC course echoed all semester long just as the four FoL throughlines had resonated during and beyond the one week summer institute.

Understanding Goals

Additionally, two “understanding goals” drew from David Perkins’s opening day plenary session at FoL. Perkins explored the deep connection between the known and the unknown. The known is the authorized disciplinary content often offered in state or professional organization standards. Whereas, the unknown links the known to deeper understanding such as discovering self or envisioning tomorrow. In the case of the model course, two understanding goals tried to capture this dialectical relationship: (1) how might students mindfully learn core disciplinary concepts of tests and measurements? (2) How might students connect the concepts of tests and measurements to the unknown?

Understanding Performances

Understanding goals naturally matched “understanding performances.” The model case course required daily student works in a writing/thinking intensive sequence. For example, in addition to encountering core concepts of tests and measurements, such as reliability and validity, students learned selected strategies including Robert Marzano’s “summary and note taking” and “similarities and differences” research based strategies for improving student achievement, KWL learning logs for critical reading and David Perkins’s’ knowledge as design method of critical thinking combined to give students a tool for encountering difficult concepts in the core textbook as well as primary documents. They completed weekly “quick writes” in

response to critical thinking prompts and engaged weekly “3-2-1 exercises. They used T-charts to make notes and T-square games to engage critical thinking. They used a set of thinking routines as well. Drawing on Langer’s mindfulness theory, twin routines were these: “What is familiar? and “What is novel? Or drawing on the great 20th Century systems thinker Gregory Bateson: “What pattern connects? Or simply drawing on thinking routines from Harvard Project Zero Research Center: “What’s going on here?” “What make you say so?”

Take the 3-2-1 strategy as an example of a writing to learn strategy. This activity elicited three ideas, two questions, and one metaphor about a given topic. 3-2-1 connected prior knowledge and student inquiry. Understanding performances thus, when translated, meant students constructed intellectual products to demonstrate understanding. Such intellectual products included power point presentations to imagine charter schools of tomorrow and a GRE-like writing examination to synthesize core concepts of the course.

Ongoing Assessments

Related to understanding performances was the TfU idea of ongoing assessments. In the model case course, the professor assessed daily student recitations, written and oral, giving feedback personalized to each student. But one ungraded and four graded assessments served to organize larger scale performances of understanding. During the second week of instruction, 23 students took the Langer Mindfulness Scale (LMS) drawn from Ellen Langer’s research on mindfulness and mindlessness. The 21 item self-report, a psychological measurement, examined four factors of the construct and trait “mindfulness” (novelty producing, novelty seeking, engagement, flexibility). Langer’s norm group of New England college students had a mean score of 108.00. The mean score for the Tests and Measurements students was 117.12, not far from one

standard deviation above the norm (SD set at 13.00). That scale served as a point of entry into the “LMS Project,” integrating textbook content on psychological and educational testing with a measure created by a world class psychologist.

In the project, students connected disciplinary content to self and others, namely, mean scores of four groups of students who engaged the LMS and an individual score or personal mindfulness profile given the four factors of the construct.

After four weeks of intensive work studying chapters in Kaplan and Saccuzo’s *Psychological Testing* and interactive lectures on the Langer Mindfulness Scale as well as Langer’s mindfulness theory, the students encountered graded assessment one: “summarize the LMS data analysis results”—the midterm essay. As a critical thinking measure, the assessment gave an answer in the form of data analysis results for four groups (six New England College classes making up Langer’s norm group, spring 2010 Theories of Learning students, fall 2010 Tests and Measurements students and a fall 2010 section of General Psychology). The student authored summary had to explain the answer in terms of basic statistics as well as connect the student’s own score to the mean and standard deviation of the four groups. In all, students had to practice Howard Gardner’s “synthesizing mind.” They created patterns to connect. They had to engage problem finding—what David Perkins said is key to modern education in his new theory of teaching *Making Learning Whole*.

The professor rated the essays with Robert Marzano’s rubric for effective summary and emailed each student a narrative response via Moodle. Then, the students engaged a feedback workshop to examine their works in depth Vis a Vis the rubric. Tina Blythe, one of the leaders in the TfU movement at Harvard’s Project Zero, said key to a performance of understanding approach was the idea that each assessment not only could show what a student knows, it could build new understanding. So

the follow up word-processed revisions could build new understanding about core concepts of tests and measurements.

Additionally, a T-square game epitomizing Perkins’s knowledge as design method of critical thinking provided a tool of self assessment as students strove to create revisions of summaries that were better no matter how high the midterm score on Marzano’s 4, 3, 2, 1 rubric. 4-quality summaries drew advanced feedback from the professor. Students were encouraged to turn top performances into publishable works. In contrast, 1-quality summaries drew feedback geared toward significant improvement toward the top quality in Marzano’s rubric for effective summary. The-T-square game added value to the range of feedback by organizing the underlying thinking about effective summaries, namely, major and minor patterns that connect. For example, in a 2 x 2 table creating 4 squares, questions from David Perkins’s knowledge as design method of critical thinking guided reflections: (1) why did we summarize data analysis results from the Langer Mindfulness Scale? (2) how might the core ideas of basic statistics help make sense of the data results? (3) how do the core ideas of basic statistics help to interpret your score on the LMS? (4) what pattern connects all four graded assessments in this writing/thinking intensive course?

Thus, students experienced an assessment of thinking and writing, got extensive feedback and an opportunity to improve. The midterm essays and revisions were revealing.

**Rubric ranks and frequency of scores in the midterm and word processed revisions
(N=24 and N=22)**

4	3	2	1	0	
4	5	10	2	3	
4+	4	3	2	1	0
5	5	7	3	2	0

By examining the four questions in the T-square game plus personalized feedback, a student could improve his or her understanding performance. Results revealed that five students created word-processed revisions that were above the Marzano rubric for effective summary. Five reached Marzano's top quality and gradient. Seven were near the top. In all 17 students did well on the revisions compared to nine on the midterm. Conversely, two students did not take into account feedback, one submitting a better written version of the midterm, but a work still void of connections among the core ideas of basic statistics and data results of the LMS; the other turning in a rewrite that ignored the thought demanding task of summarizing data results. In sum, the revisions indicated that more students improved and fewer students did not score well.

Thus, the two graded assessments along with selected literature reviews of peer reviewed articles about charter schools of the future, President Obama's Blueprint for Reform: Reauthorization of the Elementary and Secondary Schools Act as well as additional tests and measurement core concepts such as reliability and validity prepared students for the third graded assessment. They had to imagine the Barack and Michelle Obama charter school of tomorrow (2020) and present power point slide shows reflecting futuristic thinking about the envisioned school.

Their scenario was as follows: Imagine that educators of the Barack and Michelle Obama Charter School of Tomorrow wanted to use a junior version of the Langer Mindfulness Scale to chart the development of mindfulness of students. They hired the Langer research team to create such a version. How might the research team deal with issues of reliability and validity (test construction, internal consistency, test-retest, social desirability; construct validity and concurrent validity)?

Additionally, they had to compare two peer-reviewed articles about charter schools of the future and reflect on the assessment itself with two thinking routines (What is familiar? What is novel?) They had to “play the whole game,” as Perkins might say. During the last five class sessions of the semester, students presented power point slide show talks in a mini conference (“What Counts?”). 20 out of 22 students presented talks that scored from 4+ to 3 on Marzano’s rubric for effective summary. The students engaged Gardner’s “synthesizing mind,” in particular.

Finally, the young scholars in tests and measurements engaged a GRE like final examination of thinking and writing. This two hour final required students to select one of two writing prompts analyzing issues of reliability and validity in psychological and educational tests and one passage on education for tomorrow. While no student scored “6” on the (6-5-4-3-2-1 ordinal scale represented in the GRE rubrics for analytical writing, no one scored a “1” either. Most scores clustered around 4 and 3. Thus, in sum, ongoing assessments included the LMS and four summative measures of understanding performances over time, each one set in the spirit of critical and creative thinking, each one an intelligence fair assessment with high ecological validity. The five assessments created individual portfolios as well as a collective picture of the class.

Gardner's MI approach

While Harvard Project Zero's TfU became a tool for the design of instruction (a pattern connecting generative topic, throughline, understanding goals, understanding performances, ongoing assessments), Howard Gardner's MI approach became a tool for the delivery of day to day instruction that was student centered and thinking/writing intensive. According to Gardner's discussion of the MI approach in Reigeluth's compendium for new paradigm instructional design theories, the MI approach is a teacher friendly way of applying his landmark multiple intelligences theory. That meant on a given day, a class session might feature of few of his nine intelligences (verbal linguistic, logical mathematical, visual spatial, bodily kinesthetic, musical, interpersonal, intrapersonal, naturalistic and existential).

For example, a typical Tests and Measurements Monday class (in a MWF schedule) might begin with a 3-2-1 strategy as a point of entry based on Gardner's verbal linguistic intelligence and logical mathematical intelligence, primarily. Students in the model case course might respond to a topic such as the Langer Mindfulness Scale or basic statistics in psychological or educational tests or President and First Lady Obama or the differences between reliability and validity. Each would be challenged to write three ideas about the topic, pose two questions, and create one metaphor. From the perspective of the MI approach, the strategy was a "point of entry."

Diane Tabor, a facilitator of learning group N, had introduced her 18 learners (superintendents, teachers, grant writers, principals, professors, college administrators etc.) to the 3-2-1 strategy during each of the daily reflection sessions at the 2010 FoL. This had been a thinking/writing strategy all the learning groups at Harvard's FoL used. It served as a point of entry into deep thinking about the institute understanding goals, themes, plenary sessions and mini courses. For the EWC students, the 3-2-1 strategy along with College Board "Quick Writes," the point of entry for classes became a reflection tool tapping prior knowledge and setting a direction for learning more.

After a point of entry, students typically engaged a powerful metaphor or analogy to lock-in a core concept or relationship. For example, in one session, the professor passed around two identical twin Chinese silver hand exercise balls, each the size of a golf ball. Then, one student held up a ball and shook it. A high-pitched melodic sound sprang forth. Another student shook the second ball, one appearing to be identical. But a lower pitched melodic sound emerged. This illustrated individual differences on the Langer Mindfulness Scale. No individual was exactly as strong on one trait as another. Nor did any two individuals have exactly the same pattern of scores on the four psychological factors even when an overall score was the same for both participants. This concept of individual differences runs through many psychological and educational tests.

Finally, multiple representations sequenced activities leading to deeper understanding of the disciplinary content. This was particularly evident when Gardner's MI approach organized a whole project and not just a single class or week of classes. For example, "Imagining the Obama Charter School of the Tomorrow Project" opened with the professor's power point talk presenting the big picture, goals, sequence of activities and assessments. That served as a "point of entry." Then, a workshop introducing Robert Marzano's research based strategy for similarities and differences embedded a powerful metaphor in its activities, namely, a comparison of President and First Lady Obama in a Venn diagram as a graphic organizer. That served as a "powerful metaphor." In subsequent weeks multiple representations in comparison workshops included reliability and validity in psychological and educational tests. These served as "multiple representations." The entire "LMS Project" had been a huge "point of entry" and "LMS" a "powerful metaphor." The course ended with a GRE-like final examination of writing and thinking.

Note that the course folded in "information literacy" as students used Moodle frequently and located and evaluated peer reviewed articles in higher education data bases such as EBSCOhost, Thompson-Gale and ProQuest. Also, Gardner's "five minds for the future" informed the graded assessments with an emphasis on disciplinary, synthesizing and creating minds. As a central purpose, the entire course was designed to develop mindful learners. However, it would not until the spring 2011 Theories of Learning seminar that explicit work in mind brain education was offered as context. Additionally, the consciousness based education level of context is best implemented in schools using Maharishi's transcendental meditation program. None the less, context remains a factor to consider for schools of tomorrow. Along with research on mind brain education, research on transcendental meditation describes human intellectual development.

Conclusion

“Chance favors the connected mind.”

Steven Johnson

Steven Johnson’s Youtube video (based on his recent book) said it best: “Where do good ideas come from?” According to Johnson, good ideas typically result from hunches, collisions, and spaces. In contrast to the “Eureka” experience, most good ideas take time. Johnson said Tim Bernero Lee tinkered with a system for organizing his file. Off and on for ten years, his tinkering became the World Wide Web. Secondly, good ideas collide. Most often one person has a slow hunch that meets someone else’s slow hunch. The ideas collide. Something bigger and better than any single person could create can emerge. Finally, good ideas need spaces for people to share hunches. Salons in the Harlem Renaissance provided physical spaces for writers, artists and musicians to collide. The World Future Society meets annually so that 2,000 or so futurists can collide. Harvard’s Future of Learning 2010 Summer Institute provided a physical and conceptual space for the power teaching prototype to collide with Howard Gardner, David Perkins, Allan Collins, and Mary Helen Immiora-Yang et al.

Johnson points out that in the last few decades the physical space for hunch-collisions now travel at the speed of light. When Netscape introduced the Internet to the public in 1993, the world witnessed an event comparable to that of Guttenberg’s printing press, allowing for hunches to transcend physical spaces and live in digital spaces. Ideas collide, morph, send, store and restore. In brief, that narrates the power teaching prototype as well as Steven Johnson’s tale of where good ideas come from. The power teaching prototype collided with other hunches at the Future of Learning Summer Institute. “Historic increase in connectivity,” in Johnson’s words, drives the prototype on.

And what drives me on to act locally at Edward Waters College and imagine tomorrow's world class public school system in our nation is penned in this excerpt from Elizabeth Alexander's "Praise Song for the Day," a poem she delivered at President Obama's 2009 inauguration.

**We cross dirt roads and highways that mark
the will of some one and then others, who said
I need to see what's on the other side.**

**I know there's something better down the road.
We need to find a place where we are safe.
We walk into that which we cannot yet see.**

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