Possibilities Inherent in a Learning-Centered Pedagogy

Accessing and Leveraging the Richness of Human Capacities

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Learning is optimized in an emotionally, mentally, and physically safe space where everyone belongs, has a voice, and is accepted as they are.

Each of us inevitable, each of us limitless.
Each of us with his or her right upon the earth,
Each of us allow'd the eternal purports of the earth,
Each of us here as divinely as any is here.
Walt Whitman (2004, 177)

The immense power of human minds to deepen understanding, grow knowledge, and create technology to benefit and enhance lives, is evident everywhere around us. Yet low achievement on the margins of classrooms and high dropout rates for specific social groups are still a disheartening reality. One cannot escape noticing an enduring disconnect between theory, praxis, and performance in our education system. While the halls of academia are abuzz with the latest research findings and new understandings regarding teaching and learning, we find limited applications trickling down to the trenches where teachers and learners struggle within dogmatic curriculums and frustrating limitations. Even with huge monetary investments to bolster the system, the tenacious achievement gap for some groups of students seems not to be budging.

As professors with teaching experience ranging from elementary school all the way up to in-service teachers, we are continually confronted with this ex-

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asperation: teachers say that there is nothing they can do in their classroom to make the learning more engaging and relevant to the students' lives because of constraints imposed from above, while students profess to being somewhere between boredom, disregard, or hating school. Regardless of this state of affairs, academic debates rage on, leaving teachers in an ambiguous position, wavering between their own understandings of what makes good teaching and the demands of the system, between teaching for learning and teaching for tests, between caring for the wellbeing of their students and their obligation to sort, compare, label, and exclude. Their authoritative standing in the classroom has eroded and is often undermined by anxiety about knowledge, evaluations, and (im)possibilities for better teaching. At the same time, students and parents are led to believe that only school-sanctioned literacies are important and imbued with social capital, while school-prescribed curricula, focused as they are on college acceptance, confer a deficit stigma on learners who can't or don't do so. Our sociocultural institutions tend to depreciate learners who have different ways of learning, other-than-school-strengths/agendas in their lives and different ideas about their future.

Years of reflection upon personal experiences and professional work have made us aware that all people can learn, desire to learn, and want to continue learning to better their lives and opportunities. We learn from the day we are born, yet we learn in different ways and our learning diverges to accommodate various needs, interests, and goals. This diversity is considered problematic in schools and is, in general, addressed negatively (e.g., special education labeling, dropping out, failing grades), but could otherwise be seen as the amazing resource that it is. Imagine the benefits that would ensue from embracing the profusion of ideas, talents, strengths, interests, paces, and passions of *all* the intriguingly diverse children in schools. Imagine the possibilities that would open up for students if we could point each one toward achieving success at something accessible and/or important to them. Imagine harnessing the multiplicity and range of human abilities to leverage the reach of teaching and the scope of learning while exponentially expanding our understanding of the multiple faces and functions of literacy.

Contingent to such an approach is a more self-confident, creative and diversely able workforce, more fulfilled teachers and students in an energized and satisfying school experience.

An Illustration

> Hava was a dancer but had a difficult time in school, finally graduating from an alternative high school. All she really wanted to do was dance so she tried a dance program at a state college but after the first semester she was back home because of the academic challenges and she began waiting tables and bartending to support herself. She became depressed over her failures to perform and for a year did nothing but work and sleep. A friend coaxed her into an exercise class where Hava found success and trained to become an instructor. Today, at 23, she is a generally satisfied, socially productive aerobics and Zumba teacher.

This paper is addressed directly to teachers *within* the system, offering them the space and tools for introducing changes into their pedagogy to enhance learning experiences across the board. We suggest a personal change of perspective — shifting away from an industrial, instruction-centered pedagogy focused on the system itself, to a learning-centered pedagogy focused on the learners and their learning. By valuing the abilities of all students as necessary for weaving the social fabric (we cannot live without entertainers, drivers, astronomers, nutritionists, elder-care workers, nuclear physicists, gardeners, zoo keepers, and all others), teachers can direct each student towards personal possibilities of success within the given curriculum, leading to higher motivation and engagement in learning that, together with a sense of empowerment, could lead learners to undertake greater learning challenges.

"Train a child in the way he should go" is written in the Bible (Proverbs 22:6), and while other ideas we highlight are more recent, everything has been said before by greater scholars. In this paper we have culled antecedent ideas and writings and have intertwined these into an operational matrix that we believe gives teachers the option to establish learning classrooms within the current system, to the benefit of all.

Learning

What Do We Mean by "Learning"?

Learning is the ongoing process of making meaning of information leading to change in one's consciousness and behavior through participation and interaction with the environment. Information, when understood, becomes knowledge; learning is the mindful acquisition of knowledge that is relevant to our lives. This is a natural process occurring from the moment we are born (maybe even before), continuously throughout our lives. It takes place in any and every environment: at home, playgrounds, clubs, organized activities, informal gatherings, on the internet, at the zoo, museum, or alone in our room. Archimedes is said to have had his proverbial *eureka* moment in the bathtub.

Learning results from our active engagement with the cultural, social, biological and physical worlds around us, hence its strong correlation to movement.[1] Additionally, the deep changes in consciousness and behavior that we expect to see in students who learn take time and are predicated on achieving success along the way (Shane & Wojnowsk 2005; Shulman 2008).

An Illustration

> Joshua Foer, a regular guy by his own description, covered the 2005 World Memory Championships as a journalist for *Discover* Magazine. Realizing that the contestants used a specific technique to memorize huge strings of information, he decided to try it himself. For a year he explored the meaning of memory while practicing and mastering the technique. A year later he won the U.S.A. Memory Championship. In an article about his experience he wrote of his learning process: "I'd learned firsthand that with focus, motivation, and above all, time, the mind can be trained to do extraordinary things" (Foer 2011, 76).

We learn when we *want to* learn, when something *interests* us and *seems relevant to our lives and wellbeing*, when we think our lives or the lives of those important to us *will improve* through the learning, when we are *intrinsically motivated* to make the effort. Contrary to what some educators think, learning is not an ac-tivity that happens only in school and it cannot be forced on students through rewards, raising one's voice, or punishment. We learn all the time, often, in spite of school experiences.[2]

A Theoretical Compendium

Our education system was conceived around the needs and interests of the new middle class and the industrial society it was helping create in the 19th century. Schools developed to deal with mass education using ideas that would ultimately be aggregated under the umbrella of behaviorism, subsuming such concepts as the melting pot where differences are erased and homogenized to produce "mental sameness" within a vision of standardization (i.e., standardized tests, language), centralization (i.e., the teacher/curriculum as ultimate knowledge authority), concentration (i.e., work was concentrated at the office or factory, education in schools), and synchronization ("time is money") which produced a preoccupation with linear time and precise measurements (Glass 2005). To free up adults for work while preparing the future factory-centered workforce, children were put in schools and taught reading, writing, and arithmetic, with a covert curriculum of teaching punctuality, obedience, and rote, repetitive work. Today, although public education strongly emphasizes channeling "able" students into higher education, its factory-based vision and practice still prevails.[3]

This pedagogy seems to be a fair and unbiased practice due to its "color blindness" and its regard of learning as universal and linear: an "average" child given access to education *should be able* to learn, autonomous of her own and the learning environment (Street 1995, "autonomous" model of learning). Teachers instruct by depositing knowledge in the minds of mostly passive students (Freire 1993, "banking model" of education) in a *lecture-drill-review* format. Learning occurs through positive and negative reinforcement of repetitive behaviors. This approach usually does not work, however, for learners whose grades place them farther from the median of the normal curve.

An Illustration

> Sara was in 2nd grade and couldn't remember the two's multiplication table. An aide pushed in

to help her and suggested the teacher tape a times table to Sara's desk because calculators are available and Sara could lessen her anxiety and free up her mind to other learning. The teacher responded that it wouldn't be fair to the rest of the kids. "Why not put one on every desk?" asked the aide. "It's cheating" was the perfunctory reply. So Sara stayed in special education, slipping farther behind as she worked with parents and tutors on memorizing the multiplication table and building a deep anxiety associated with school, tests and, especially math.

At the intersection of the industrial and knowledge economies we find the advent of cognitivism, propitiously adding the minds of the learners and their social contexts to the teaching/learning equation, focusing on the content of learning. While the individual brain is likened to a computer processing incoming information, the human mind, consciousness thoughts, meaning making, language use, and educational pedagogies are understood to be ideological constructs situated in specific cultural and social contexts (Vygotsky 1986). According to the concept of distributed cognition, knowledge construction is achieved through negotiation among and between the learners and their environments, texts and artifacts, teachers, peers and classroom settings/contexts (Gomez et al. 2010). Teachers orchestrate the instructional setting and the multiple interactions within it to elicit learning outcomes from the students — outcomes that are mostly preconceived (a "right" answer) and subjected to measurement by standardized instruments.

The New Literacies approach holds that literacies are multiple, contextual, inextricably connected to learners' circumstances, environment, sociocultural experiences, ways of knowing, and embedded in social power hierarchies. Learners are affirmed in pursuing specific content/information, or not, according to the fit and interaction between their personal literacy constructs and interests to those of the learning environment (Barton & Hamilton 1998; Ogbu 1992; Street 1984, 1995; Vygotsky 1986).

An Illustration

The 7th grade teacher was teaching about the repressive and inhuman conditions in Polish ghettos in 1938. Interrupting her, Tanisha called out, "Are you telling me that these people lived in ghettos like us?" The teacher had to rethink her script and augment it to include Tanisha's experience, explaining that there are different ghettos in different places and times in history, connoting similar or diverse experiences. The lesson continued with the teacher asking the students to compare/ contrast the Polish and current urban ghettos in small group "think-tanks."

Constructivist theories, firmly rooted in the knowledge economy, endorse learning as an organic (not mechanistic or linear), contextualized process of evolving construction and reconstruction of knowledge in relation to the interaction between embodied individual experiences and socioculturally embedded dynamics. Learning is an ongoing individual process that we all engage in throughout our lives in order to understand the world and help ourselves fit into our specific environment (Clancey 2008; Heylighen 2010).

Educational constructivists accept cognitivists' understanding of the structures and functions of the mind, but shift the focus to the *process* of learning rather than the *content* by looking at: 1) the contextualized, situated, individual learner/mind and the diversity of motivation, attitude, contexts and conditions of learning,[4] and 2) the specific brain functions through which information is transformed into knowledge and the manipulation of this knowledge for the manifold human needs (Harlow 2006).

Constructivist pedagogy embraces four key principles: 1) Learning is a dynamic process of creating changes in consciousness and behavior as learners actively construct and reconstruct their knowledge through interactions with and participation in their environment. 2) Learners are co-producers and active participants in planning, monitoring, and evaluating their learning, and are responsible for self-motivation to learn. 3) Learning is based on processes of distributed cognition in the interaction between two or more people and/or the tools/artifacts available to them. It is socially (i.e., schools, sports teams) and culturally (i.e., literature or music) constructed in collaborative experiences of thinking and action where participants have a common goal and share responsibilities of reaching understanding. 4)

Learning is situated and contextualized: the content as well as the physical conditions and mental environment of learning powerfully impact the individual's learning process. What one already knows affects and channels what is expected to be learned, what will be learned, stored in memory and retrieved (Dolmans et al. 2005; Ormrod 2008). Going back to Sara and the multiplication table, constructivists would realize the need to use Sara's strengths to access her learning abilities while allowing her to achieve small successes on the way.

Learning dynamics are complex and messy as learners are challenged to think critically about the world, struggle, take thinking risks, experiment, investigate, discover, and construct knowledge. The knowledge base of disciplines cedes priority to "the meta-skills that underlie knowledge acquisition and application *across* disciplines: immersion, curiosity, resilience, critical thinking, the embrace of complexity, the persistent quest for converging evidence" (Shpancer 2004, 27). Learning methods that are anchored in authentic situations to the point of "cognitive apprenticeship" are a way of enculturating learners in literacy practices through social interaction (Mattar 2010). Teachers mindfully lead and scaffold students' learning as coaches, enablers, and supporters in a polyvocal process that involves all as both teachers and learners, because "[g]ood teachers do not *instruct* pupils what to remember; instead they help the pupils to *construct* their own understanding of a concept" (Heylighen 2010, 41).

An Illustration

The 4th graders were preparing for Columbus Day. First introduced was the traditional narrative focused mainly on the first voyage: *Follow the Dream: The story of Christopher Columbus* by Sis. The children learned the story from Columbus's perspective and developed empathy toward him and his enterprise. Next, *Encounter* by Yolen and Shannon was introduced, recounting the same story from the perspective of a Taino boy, native of Hispaniola where Columbus and his people maimed, killed, infected, extorted, and enslaved the population.
Adam was surprised to hear such a different story about the same events and wondered aloud whether this was the same Columbus. Teacher and students began questioning the texts, negotiating the seeming gaps between the two stories in an attempt to understand what actually happened. Teacher and students together and individually reconstructed new understandings of Columbus's voyages.

The amount of knowledge available in the world has doubled in the past ten years and keeps doubling every 18 months in the present. While previous theories focus on knowledge as an *objective* or a state that is attainable by a learner, *connectivism* focuses on the networks in which human knowledge is stored and the processes of accessing this knowledge by an interested individual or organization. Learning can no longer be based on one's experiences alone and needs to connect to experiences of many others, creating a network of up-to-date knowledge which resides in human and non-human networks (i.e., a community, a database). Knowing where to find needed information and gaining access to it, is considered more important than the knowledge one already possesses (Siemens 2005).

So, rather than schools being about memorization of content (7x9=?), in present global and local circumstances the focus must be on literacy of information navigation, "…the ability to be your own reference librarian — to know how to navigate through confusing complex information spaces and feel comfortable doing so" (Brown 2002, 5). The teachers' role, in addition to being enablers, role models, and coaches, is to offer a narrative of coherence for the deluge of information about the topic being taught/learned.

Putting these ideas together allows us to envision a different approach to schooling: a learning-centered pedagogy approach that provides all teachers and learners the potential for self-empowerment through success within the current system.

A Learning-Centered Pedagogy

To better function in the current and developing work and living environments, we need less generalized content and more specialized knowledge, creativity and innovation, flexibility and adaptability to changing circumstances. Educational objectives need be fine-tuned to increase these skills, cultural understanding and respect, communication, collab-

oration, problem solving and ethics, and to work for purposes beyond self-interest to improve the lot of all (Gardner 2008; Kress 2010; Robinson 2011). General education should focus on

> cultivating children's building of repertoires of cognitive and behavioral strategies and options, helping them to recognize the complexity of situations and to respond in increasingly flexible, sophisticated, and creative ways (Immordino-Yang & Damasio 2007, 7).

A learning-centered pedagogy culled from existing educational theories and framed within the prevailing system can facilitate reaching these goals.[5]

Two basic concepts underlie a learning-centered pedagogy: Learning is both universal and personal.

Learning is universal. All people can learn, want to learn and learn continuously. We learn mindfully, as we construct and reconstruct our mental models with new knowledge relevant to our lives, through active, interactional experiences of experimentation, investigation, and discovery. Our learning is optimal when immersed in authentic situations and where learners engage and take responsibility for co-producing their own learning. Learning happens all the time in all of our life situations, yet classrooms need special attention to be become loci for actively producing learning since they are traditionally arenas for delivering instruction.

Learning is specific to each learner in context. A learning-centered pedagogy foregrounds the *situated nature of cognition* embodied in our physical/biological abilities and capacities, as well as in the external cultural and social environments within which our minds are embedded. Literacies are multiple and their value varies according to every learner at a specific time and place (fixing cars, painting, cooking, molecular biology, writing legal documents, teaching pre-K, raising kids, reading the classics, etc.). We can be intrinsically motivated to learn when our lives and interests are included and when teaching emanates from understandings regarding how/when/why people learn best, supplying the necessary skills/tools for learners' to realize their *own* learning potential. Teachers must leave the limelight to metaphorically become a hub and network administrator initiating, facilitating, supporting, and bridging diverse students' learning as they develop appropriate mindful capacities. Student learning is assessed individually through "tangible outcomes, changes in students' skills, values, understanding, propensities or sensibilities," rather than through tests and comparisons (Shulman 2001, 4).[6]

The Magic Toolbox

What does a learning-centered pedagogy look like in practice? Mie Araki (2003) provides a glance at such a process in *The Magic Toolbox*, a young children's book that reaches deep into the heart of the issue. The story tells of Lulu the rhinoceros who repeatedly succeeds in building with blocks while Fred the rabbit always fails, until he loses his motivation and leaves the classroom. Outside he finds a "magic" toolbox that provides him with direction and (very regular) tools as well as physical and emotional support as Fred plans, draws, saws, hammers, and builds a wonderful "real" house. When Lulu sees the house, she is astonished and asks Fred how he managed such a feat. Araki's answer: "Nothing to it when you have the right tools." The last page of the book shows Lulu and Fred dreaming of building a huge castle together.

The Magic Toolbox abounds with insights about learners, learning, and effective teaching. First and foremost is the understanding that everyone *can* learn, and that even if the traditional curriculum (e.g., building with blocks, which are available, considered age-appropriate and the right stepping stone on the way towards higher level learning) confounds some, they can and will learn in other contexts and in other ways, highlighting the understanding that much learning happens *outside* the classroom and the sanctioned curriculum. Second is the realization that the teacher's job is twofold: to enable the learning process and to support the learners' efforts. In the story, the toolbox enabled Fred's success by teaching him that he must plan and draw his house before he could begin building it, or when he was building the chimney, for example, the toolbox supplied the bricks. When, at times, the work seemed too difficult or painful for Fred who banged his finger, became tired, dropped a nail while standing on top of the ladder, the toolbox provided a cherry lollipop, band aids, encouragement, and a positive, lively attitude. (It juggled the paint cans as Fred was painting the house.)

During the whole process the toolbox/teacher is always there, but a bit to the side (in one scene it is "napping" on the swing while Fred works, smiling) and it never "tells" or corrects, only gently directs Fred's process. When Lulu marches in to give the final judgment about the project, Fred is seen standing tall and proud by the door of the house and the toolbox/teacher is on his side deferring to him. This emphasizes the concept of teacher as coach and supplier of tools to the learners' learning processes and it inspires us to realize that it is the learners' success that is the teacher's ultimate goal and reward.

Understanding the processes of learning in the brain and mind can help us make informed pedagogical decisions as foundations for lessons in which students are empowered to learn and teachers are empowered by their students' success.

Learning Processes in the Brain and in the Mind

Survival Mode or Learning Mode

The primary role of the brain is safeguarding one's survival by constantly scanning the environment for signs of physical, cognitive, and emotional danger and responding/correcting for problems (Wolfe 2001; Zull 2002). Input from our senses goes directly to the amygdala, the emotion processing center in the brain, and is evaluated for threats to our wellbeing. If threats are detected, the amygdala literally hijacks the prefrontal cortex, which governs our decision-making capabilities, and our "fight-or-flight" system kicks in. The brain goes into "survival mode" in which it is reactive, concentrating on removing the physical and/or emotional danger while becoming unavailable for learning, innovation, flexibility, or for processing any incoming information that is not directly relevant to the present crisis.

An Illustration

Danny wandered around the office aimlessly, alternating seats between the principal's room and the secretary's desk, receiving an occasional pat and caring words from whoever walked by. When asked why Danny wasn't in class, the principal answered: "He is unavailable for learning today. He is very agitated, very anxious. Things are going on in his life that are difficult for him to handle, so we let him be

where he feels comfortable. He can't learn in this condition anyway."
Danny wasn't speaking to anyone except for repeating in a low voice: "Tomorrow we are going." At one point, the principal reacted to this "chant": "You're moving to the new apartment tomorrow, I know," she said on her way out. "We're going on a plane" he replied quietly, but she was out of earshot.
The next day Danny was gone. He was smuggled out of the country by a relative fighting the state for custody over him and his two brothers. It later turned out that Danny knew that they were being kidnapped but was threatened with death if he told anyone who could foil the trip. No wonder Danny was unavailable for learning at that time (Ben-Yosef 2003b, 105-106).

When people feel safe, when they realize that there are no threatening situations close by, no immediate major fears or stress, the brain changes into "learning mode" where it is freed up, open, and available for attending to learning. In this safe space the learner's brain is ready to lay down new networks and create new neuronal connections for constructing new knowledge. Importantly, the two modes of the brain, survival and learning, are *mutually exclusive* so that we can only be in one or the other at a time, hence the primary objective of a learning-centered pedagogy is the creation of safe classrooms where students' brains can be in learning mode.

In the Classroom

The most important implications for teaching/learning is that students in survival mode due to anxiety, fear, worries, depression, hunger, lack of sleep, etc., are physically unable to learn and nothing extrinsic can force them to. (There might be rote compliance and/or memorization, but not true learning). Teachers would be most effective in such situations by allowing these children to stay outside of the teaching/learning circle for a while, as they attempt to help with the issues the child is dealing with. The tool to be used is patience based on the understanding that for learning, which is our goal, time is not of the essence, the learner is.
The fundamental concept underlying a safe

classroom is an ability approach to *all* learners, the non-judgmental, honest belief in every student's desire and ability to learn and succeed — at some times and some things better than others — according to personal goals and circumstances. Safe classrooms value diversity and polyvocality, are experiential, focused on learning and learners, are respectful of students' needs, interests and passions, with teachers leading as coaches and enablers of everyone's learning.

Cultivating a sense of belonging to the classroom community also engenders feelings of safety, because inclusion gives us a feeling of being worthy, protected, and powerful; we care for other members rather than judge them, take responsibility rather than try to disappear from sight, and are motivated to participate because we have a stake in the game. Think of sports fans that go to games, root for "their" team, follow the players' lives and remember all the stats. They tie the big story (of the specific sport) to the little story (of their own lives) resulting in a feeling of inclusion (VanDeWeghe 2011). In the safe classroom we can create a sense of belonging by tying the big picture of dominant literacies, curricula, and school culture to each of the students' little stories: their lives, interests, and proclivities.

To better understand how to facilitate such inclusive experiences, we need to dig deeper into the learning/brain connection.

Learning and the Brain[7]

The human brain is a dynamic organ that always learns as it encodes information in response to our interaction with the environment. Our brains develop throughout our lifespan because of their plasticity, the ability to change over time. *Experience-expectant* plasticity is a general evolutionary expectancy of experiences of human beings living in the world related to universal basic needs such as food, shelter, and procreation. We study, train, and search for a job that can afford us these basic human needs as we go through the lifecycle (Gruhn & Rausher 2007).

Experience-dependant plasticity is change in the brain as a result of exposure to specific environmen-tal stimuli that a specific individual experiences, such as going to school, working in a coal mine, being a nurse, skateboarding, etc. (Gruhn & Rausher 2007). As we act and interact within our unique contexts, our senses input distinct information into our brain where it can become knowledge. This leads to the realization that every person will have very different contextually dependent knowledge, while our *experience-expected* knowledge will be quite similar.

Learning transforms the existing networks of neurons in our brains by either creating new connections between neurons (synapses) when new information comes in, or by strengthening existing connections through experience and repetition (called Hebbian learning). New neuronal connections must always attach to already existing networks. For example, if we were to address a person in a foreign language she doesn't know, the sounds would reach her brain, but without finding any existing neuronal networks to connect to, would not "stick" to become knowledge in her mind. This learning dynamic was described by Piaget metaphorically as processes of assimilation and/or accommodation for restoring equilibrium in the schema when it is disrupted by new information: A learner who encounters and begins exploring an object or idea, initially tries to assimilate this new information into her existing schema and if it matches existing categories, it is assimilated. If the new information does not match current schema, disequilibrium ensues. The learner is motivated to re-establish equilibrium through accommodation, a process of reconstructing the schema to fit the new information (cited in Harlow et al. 2006, 45).

An Illustration

A child who is told not to touch the coffee cup because it is "hot" may listen and learn or may need to touch the hot item to experience the feeling. In either case, through participation and interaction with the environment (more experienced people, the hot item itself), the child learns that hot things should not be touched and will from then on, hopefully, change her understanding of hot things and the behavior towards them. If the child already has a category of "don't touch/pain" in her mind, it will be easy to assimilate the new directive of "the

coffee cup is hot so don't touch it" into a prior knowledge category. When the information coming in is different from the existing schema and there is not a clear category into which to fit it, a new category is created to accommodate the new concept. If "hot" is a new concept for the young child, she will have to rearrange other categories in her mind (i.e., "things that I can touch," "things that cause pain") to make space for the new category of things one should not touch since they cause pain.

All this said, we must remember that there is diversity in mental functioning just as there is in any other aspect of human life. The idea of neurodiversity prompts us to apply an ability approach to different ways of knowing and learning and see these as lying on a continuum, so "instead of regarding large portions of the American public as suffering from deficit, disease, or dysfunction in their mental processing, neurodiversity suggests that we instead speak about *differences* in cognitive functioning" (Armstrong 2010, 1). As any other mindful activity, our ways of knowing and learning are socially/culturally/historically constructed and just as mental capacities can adapt to environmental demands, there is the possibility of adapting the environment to the specific abilities of differently-functioning brains of learners. And the more enriching the environment, the more complex is the network of neuronal connections that develop in the brain which, in turn, has an easier time adapting to the needs of the surrounding environment (Armstrong 2010; Ben-Yosef 2010, 2011; Bransford, Brown & Cocking 2000; Massa & Pinhasi-Vittorio 2009, Pinhasi-Vittorio & Martinsons 2008, 2009, 2011; Wlodkowski & Ginsburg 1995).

In the Classroom

The dynamics described above provide us with a vital tool for creating a productive lesson: teaching that begins from where the students are, from the history, stories, and experiences they bring with them to the classroom, from their existing funds of knowledge, interests and diverse ways of knowing. Learners who find connections between activities in the classroom and the knowledge/concepts/associations/ex-

pectations/interests already in their own minds, will be more motivated to engage with this information.

A Working Example

When the curriculum directs us to teach biography, rather than choosing a person for the whole class to study ("Someone I think you will all find interesting…"), the teacher can allow every student to choose someone of interest to them, be it a race car driver, rapper, female basketball player, or someone who grew up in their neighborhood and wrote a memoir. The students are encouraged to present their work to the class in a format of their choice (technology, music, art, etc.) which adds to their motivation and enriches both the individual and the general learning experiences.

The benefits here are at least threefold: 1) Self-motivation and engagement in learning will be strong, allowing the teacher a position of facilitator (rather than drill sergeant); 2) The presentations and sharing of work lead to wider and richer learning experiences for the whole class, and most importantly; 3) Learning has great potential of becoming a positive/successful experience, possibly even reaching Csikszentmihalyi's (1996) "flow" where the learner is one with the activity she enjoys doing — which, in turn, leads to motivation for engaging in more of the same.

Learning and the Mind

A person never steps in the same river twice,
because the river is different and the
person is different.
Heraclitus

Our minds are flexible structures/networks of existing knowledge that are construed metaphorically as webs of belief (Quine 1960), mental models (originally coined by Craik, 1943/2010) or schema (Piaget 1953) that change and develop by attaching new information to the knowledge which is already there. In an individual process of fitting incoming bits of information from the world surrounding us to our minds, we reconstruct and transform our existing schemas time and again to assimilate, accommodate, or discard information. Ultimately, information in and of it-

self is meaningless until it is acquired by the mind of an individual, connects to her existing schema, and becomes useful knowledge to that specific person.

Mokyr (2003) differentiates between two kinds of "useful" knowledge a person should aspire to attain: *propositional* knowledge that describes and catalogs natural phenomena and regularities, and *prescriptive* knowledge that we call technology, which deals with the use and manipulation of phenomena for human needs. Teaching is a technology for use in promoting student learning, which itself is a technology used for growing one's mind and knowledge. Mindful teaching provides learners access to both kinds of knowledge that they learn to transfer and use in future situations.

Through learning we make sense of the complex world, parceling, ordering, categorizing, and classifying it into piles and groups, making distinctions "for the same reasons we carve a turkey or write our books in chapters — to make the world more manageable" (Shulman 2008, 36). Shulman (2002) organized learning into a dynamic cyclical process that proceeds through interaction with the environment and leads learning from perception to participation (although the cycle usually begins from engagement, it can begin from any other point). (See Figure 1)

Learning begins with student engagement, which in turn leads to knowledge and understanding. Once someone understands, he or she becomes capable of performance or action. Critical reflection on one's practice or understanding leads to higher-order thinking in the form of a capacity to exercise judgment in the face of uncertainty and to create designs in the presence of constraints and unpredictability. Ultimately, the exercise of judgment makes possible the development of commitment. In commitment, we become capable of professing our understandings and our values, our faith and our love, our skepticism and our doubts, internalizing those attributes and making them integral to our identities. These commitments, in turn, make new engagements possible (Shulman 2002, 39).

Cognition/knowing/learning is a continual, natural process of problem solving (Simon 2001). Couched in thinking and action, it is partially a concrete and partially an abstract process. Cognition is embodied in our physical/biological being through which it in-
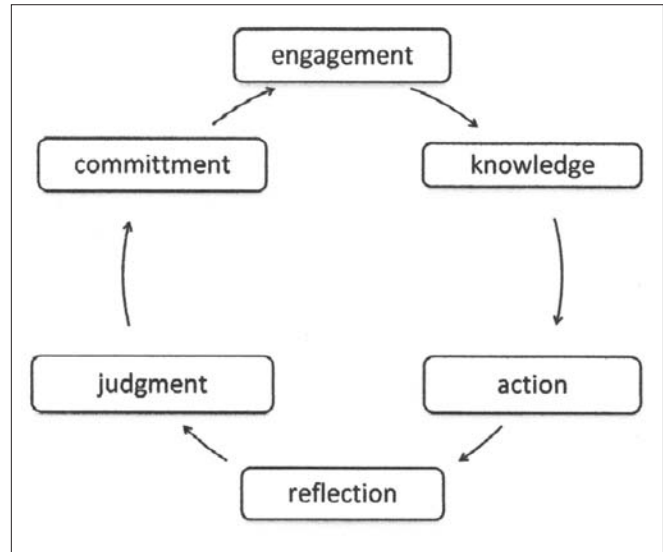

Figure 1. The Cycle of Learning

teracts with the environment, our senses through which information enters our system (i.e., touch, smell), our muscles and motor system through which the cognitive system acts upon the environment (i.e., hands, vocal chords), and a feedback loop connecting the two (i.e., a child learning to speak must be able to hear her own voice) (Heylighen 2010).

Language connects abstract reasoning with concrete experiences to construct understanding in our minds. An example is the analogous connection between the abstract concept of "boundless" to the concrete sensation of "sky" when we use the expression: "the sky is the limit" (Heylighen 2010). In another example five-year-old Alex's grandmother asked him what "cold" meant and he said it was a snowman. In fact, the snowman was so cold that if he hugged him, Alex would get cold and could get sick. A bigger snowman was even colder and could kill Alex, he said. Alex's mental model which included the experience of playing in the snow, building a snowman and feeling cold, connected to the grandmother's question, with which he engaged through metaphor, allegory, and story (Fuchs 2009).

In addition, as the great educational pioneer Comenius figured out in the 17th century, when concrete images are presented to the learner together with abstract words, understanding is enhanced.[8] We too have realized the importance of concrete experience to instigate, motivate, and elucidate learning:

making and experimenting with physical objects (including drawings and notations) facilitates the learning of abstract concepts, as well as the generation of new insights that promote abstract thinking (Clancey 2008, 27).

The concept of dual coding emphasizes the role of the non-verbal, imagery subsystems (visual, auditory, touch, and motor) for reinforcing the understanding of language, showing that non-verbal and verbal codes in our minds have an additive effect on understanding and recall. Concretization and imagery enhance memory, so that "concrete memory exceeds abstract memory performance by a 2:1 ratio on average" (Pavio 2006, 4).

Our own studies and practice have led us to the arts as a vehicle for leveraging diversity in our classrooms to enhance imagination, expression, and understanding (Ben-Yosef 2009a, 2009b; Ben-Yosef & Pinhasi-Vittorio 2008-9). Children who engaged with varied arts experiences over time were found to be

> more confident and willing to explore and take risks, exert ownership over and pride in their work, and show compassion and empathy towards peers, families and communities. (Burton et al. 2000, 248)

Learning through and in the arts according to Fiske (1999, ix-xi) allows teachers to reach students who are not otherwise being reached, especially those who are disengaged and at greatest risk of school failure, to engage students in ways that are better suited to their learning styles and comfort zones, and to provide multiple new challenges for successful students who outgrow their established learning environment.

Structures that exist in spoken languages also profoundly impact the knowledge we acquire and the ways in which we perceive reality. An example are cultural concepts of gender characteristics given to objects in some languages that exert a powerful hold on speakers' associations (Deutscher 2010). In German a bridge is grammatically feminine and speakers tend to describe bridges as "beautiful, elegant, fragile, peaceful, slender," while in Spanish bridges are linguistically masculine and are described as "big, dangerous, strong, sturdy, towering" (p. 210). It

is easy to imagine how such linguistic markers can impact a learner's understanding and expression.

On the abstract level, Weisberg (2006) outlined several characteristics of thought important for understand learning: Our thoughts follow one another in the order of having been experienced; our thinking processes are strongly rooted in past experiences and they change/grow incrementally away from the past toward the new (the concept of the Zone of Proximal Development or ZPD); our existing knowledge/concepts/expectations direct our thinking processes, thus, familiar events will be processed in our minds much more readily than unfamiliar events, which brings us back to the idea that new knowledge must connect to that which is already known.

In the Classroom

Learning is an individual feedback process of connecting the concrete to the abstract using knowledge embodied and embedded in the learner and her environment. Bringing cognitive awareness into our pedagogy means teaching that is based on the way people learn best: 1) realizing that it is the learners who learn, who have to go through the cycle/process themselves (providing answers is not teaching) and make meaning of information as it relates to their existing schemas; 2) utilizing the concept of the ZPD regarding the incremental growth of knowledge from what one already knows to new knowledge; and 3) incorporating non-verbal elements and the arts can profoundly enhance imagination and possibilities in teaching and learning.

A Working Example

Gallas (1991) incorporated arts into her 1st grade pedagogy as "a methodology for acquiring knowledge, as subject matter, and as an array of expressive opportunities. Drawing and painting, music, movement, dramatic enactment, poetry, and storytelling: each domain, separately and together, became part of [the students'] total repertoire as learners" (p. 40). This worked especially well for Juan, a student who had just arrived from Venezuela knowing no English. Through painting, modeling and constructing,

Juan expressed his existing knowledge, what he desired to learn and what he actually learned, circumventing the obstacle of not knowing the language yet using it simultaneously. Gallas and Juan "built a reading and speaking vocabulary from his pictures, and that vocabulary, together with his interest in representing science, also became the subject matter of his writing" (p. 41)

Two issues come up at this point: representation and motivation.

Representation (frames of reference). In his book *Fish is Fish* Lionni (1970) tells the story of a fish and a frog who grew up together as friends in a pond. One day the frog jumped out of the water and lived on land for a while until coming back to the pond and telling his friend the fish about what he saw outside. He described birds and cows and people. But the fish, who had never been out of the pond, could only envision these things as they related to himself. So the spotted cow with four legs, horns and an udder, standing in the meadow chewing grass looked in the fish's mind like a fish with added characteristics. (See Figure 2)

A learning process involves enriching and elaborating our existing schema, or mental model, as we try to understand new information by connecting and relating it to the representation of knowledge already in our minds. When we encounter new information, we first try to break it down into smaller, knowable components (Simon 2001) that we can assimilate/accommodate into our existing categories. Lionni's fish broke down the frog's description of the
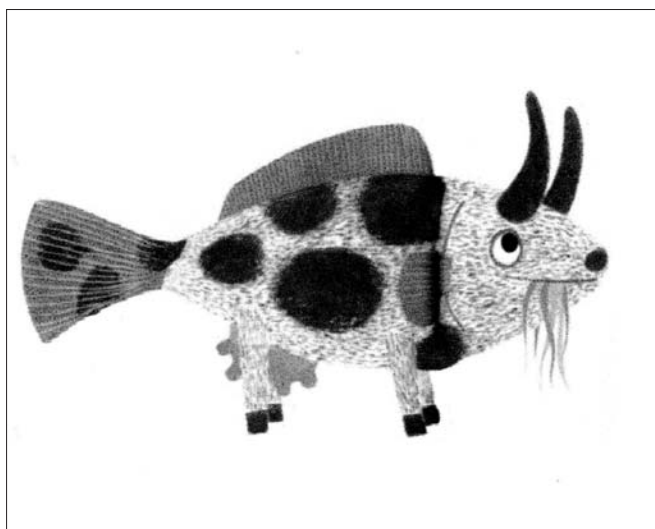

Figure 2. A Cow in the Fish's Mind

cow to its components of horns, spots, etc., and related it to the knowledge already in his mind regarding "living creatures." This newly constructed knowledge, however, is misconceived.

Sometimes our frame of reference may lead us to misconceptions. This happens when our mental models are flawed: They may not conform to accepted models; they may not have an appropriate level of complexity; or they may not have been incorporated correctly into the existing model (Modell, Michael & Wenderoth 2005). Since there is little likelihood that the fish will ever encounter a cow, its misconception may serve to enrich its imagination but will not cause it other learning problems. However, for students in a classroom misconceptions can interfere with understanding a topic and they pose serious challenges for the teacher. Within an Instructional pedagogy, teachers tend to discount a student who doesn't get it, relegate her to the group on the left side of the "normal" curve, and label her as inherently deficient. Within a Learning paradigm, the teacher's main concern is the student's learning and finding ways of recognizing the misconception and helping her modify her mental model to appropriately understand the issue at hand. It is important to note here that only the individual can correct or modify her own mental model, so passively providing "correct answers" does not solve the problem (Modell et al., 2005).

An Illustration

An elementary school teacher was teaching fractions by using, what she considered to be a common reference, "a Thanksgiving holiday favorite: pumpkin pie." Well into the lesson, an African American boy asked: "What is pumpkin pie?" Most African American families serve sweet potato pie for holiday dinners, so it is their common referent. The young student who didn't know what pumpkin pie was, most probably was preoccupied with trying to imagine what the pie is like rather than focusing on the fraction lesson, leading to this child "not getting it" and beginning a slide in math (from Bransford, Brown & Cocking 2000, 72).

It isn't that some people don't understand; they simply understand differently. And while in some

areas this doesn't pose a problem, in schools it might. Again, an example from a children's book: *It's a Book* by L. Smith (2010) tells of two friends, a donkey and a monkey, sitting together and reading; the donkey is working on its laptop and the monkey is reading a book. There is a culture/language gap between the two readers with the donkey asking if monkey's book needs a password, can it blog? text? scroll down? where's the mouse? etc., and the monkey repeatedly responding "No, it's a book," which the donkey, of course, doesn't understand. Although donkey ends up reading the monkey's book, the story of *It's a Book* ends without mutual understanding. The thrust of this tale are the misconceptions of information and the barriers they present to communicating, understanding, and learning.

As a side note, the illustrator, Molly Leach, drew the monkey much bigger than the donkey leading to the inference that we have a generation gap here, something teachers should be aware of as they assess their own possible cultural misconceptions.

In the Classroom

In order to facilitate an inclusive discourse for the various representations our students bring to class, we need to begin by asking learners to share their knowledge and thinking processes while providing them common experiences of moving from the concrete to the abstract so that everyone is on the same page. Teachers must be able to 1) determine whether their students have misconceptions about the material; 2) encourage students to realize the need for changing their mental representations; and 3) support the students as they make the necessary changes to their mental models to promote successful learning (Modell et al. 2005, 22).
Dealing with representation and misconceptions is crucial for achieving success in teaching and learning. No less crucial is engendering an atmosphere within which the learners are motivated to take up the challenges put before them, risk making mistakes on the way, and feel strong and confident enough about their learning abilities to become what Doherty and Ketchner (2005) call "intentional learners": empowered to be in control of their education,

owning their learning, and, ultimately, including themselves in any learning discourse.

A Working Example

The physics teacher is introducing the concept of momentum. He knows that in order to grasp an abstract idea students will be helped by a concrete experience which will also equalize the starting point of learning for all students, so he takes them to the monkey bars. First he asks the students to hang motionless from one bar and try moving to the next bar with one hand. When they find this impossible, the teacher asks them to suggest solutions. They experiment and realize that they need to swing their body at the same time as moving their hand toward the next bar. This swinging push, the teacher explains, is called momentum.

Motivation is the natural capacity to direct energy in the pursuit of a goal and it is expressed by engagement with an activity. On the one hand, learning is a personal process that takes place at a specific time in a specific brain (no one can learn for us, correct our misconceptions for us, or force us to learn), so in order for someone to engage in learning, they must be intrinsically motivated to do so (Massa & Pinhasi-Vittorio 2009; Park 2006; Pinhasi-Vittorio 2009; Wlodkowski & Ginsberg 1995; Zull 2002). On the other hand, motivation to engage in learning is strongly tied to the learner's culture and life experiences (Is the student available for learning, or are there home/peer issues that are distracting her?), to the learner's interests and goals (Can schooling get her where she wants to go?), to the learner's emotions (Is the material appropriately challenging? Exciting? Is the classroom safe?), and to the learner's prior experiences of success. Research on motivation and reading engagement recognizes the importance of the social context of learning to increasing intrinsic motivation: social relationships, task values, home–school partnerships, freedom to control one's learning, practicing real-world literacy tasks and providing learning strategies (Rueda et al. 2007). Above all, learning is energized by success or the feeling of potential for achieving success.

Meltzoff et al. (2009) focus on the social nature of informal learning venues which offer forms of

mentoring, apprenticeship, and participation that maximize motivation and engagement tied to the learner's developing sense of identity. When Sagor (2002) wonders at the motivation of teenaged skateboarders who, with a success-to-failure ratio of 1/100 when learning new tricks, continue to struggle and persevere at perfecting their art, he finds that motivation to learn emanates from attempts to satisfy five basic human needs: feeling competent, belonging, usefulness, feeling potent, and feeling optimistic. Smith and Wilhelm (2006) added the need for immediate feedback and the relevance of the material learned to the learner's life. Thus, learners will be motivated to learn and be willing to persevere despite hardships and setbacks if they feel that they *can* achieve success and that the outcomes of the learning will be relevant and useful to their lives and identities.

Motivation is associated with control. Our brains work hard to stay in control of our body while feelings of loss of control lead to anxiety and fear, sending the brain into survival mode. Students who have no control over their learning in terms of content, style, time, or pace will most likely lose motivation because their own lives and interests are removed from the equation. But, if a "space of freedom opens before the person moved to choose in the light of possibility, she or he feels what it means to be an initiator and an agent, existing among others but with the power to choose for herself or himself" (Greene 1995, 22). The feeling of control over their own learning empowers learners to challenge themselves in ways that outsiders might not be able to, motivating them to keep trying.

Success, however, is the prime motivator. When we succeed at something we are energized to repeat the experience and to challenge ourselves even further. This ties in to the fact that learning is steeped in emotion since it is the emotion chemicals (adrenalin, serotonin, and dopamine) that modify the synapses in our brains (Zull 2002). When we are emotionally engaged we are motivated and vice versa.

An Illustration
(From the reading journal of an
ESL college undergraduate)

It was the first time in my life I read a book
that was written in English. I was always
afraid that will be too many words I would not

know…. Read an English book always seems
an invisible wall for me I never even try to
break through… But I tried. I did not give up
first this time. Then I realized this was not as
hard as I thought it was. I was able to get
meaning out of the book just like I was reading
a Chinese book. This is giving me so much
confidence in reading. It makes me believe
that reading English is something I can do.

Efficient learners integrate their emotional reactions with their cognitive processing, constructing relevant intuitions that guide their future learning as it relates to basic survival instincts (Immordino-Yang & Faeth 2007). A student who makes a mistake and gets a big red X on her paper will in the future tend to disassociate herself from such "dangerous" activities both physically and mentally (stomach ache on the day of the test…). A student who receives a good grade will in the future look forward to more such challenges, improving her "survival" possibilities. Likewise, the more emotion-laden the stimulus, the more attention it gets from our brain, so we can say that emotion drives attention (Wolfe 2001). Attention, when it is *shared* with others, facilitates learning, so in classrooms where there are multifocal attention trajectories — teacher to students, students to teacher, and students to each other — engagement ensues (Meltzoff et al. 2009).

In the Classroom

A safe classroom where mistakes, misconceptions, and misunderstandings are part of the learning journey, can be seen in the documentary film *Teacher Irena* (2010). The teacher asks a 3rd grader how much 70+10 is. His answer: 79. She responds (something like this): Yes, you thought I asked about 70+9 and your answer is correct, but let us see if you can figure out 70+10….
A teacher who thinks that a failing grade, pointing out mistakes in front of the whole class (as happens often while students read aloud), or marking papers with powerful Xs, are all motivators "to try harder next time," must become aware of the role of emotions in opening or shutting down learning. Immordino-Yang & Faeth (2010) suggest three strategies for teach-

ers to cultivate and support the development of strong learning: 1) Control: fostering emotional connections to the material by allowing choices in learning and expressing knowledge (a play, a poem) and involving students in curricular decisions. When they are involved in designing the lesson, students are more emotionally invested in and attached to the learning outcomes. 2) Belonging: showing students respect by relating the material to their lives and interests and hooking into their passions, allowing them to identify with the material. 3) Success: designing open-ended activities that allow space for student creativity, risk taking, making mistakes and learning from them; safe spaces where emotional reactions tend to thrive and drive engagement, and engender intrinsic motivation to learn with pleasure and perseverance.

A Working Example

In a 12th grade history class the teacher had a unit planned according to the curriculum, but the students asked to learn about the approaching Veterans' Day. Realizing that there is no motivator as powerful as interest, this teacher scrapped his planned unit and substituted it with the topic the students requested. Students were asked to bring in personal stories connected to Veterans' Day from family members or acquaintances who were involved in current or past wars. The teacher then hooked into their ways of learning through media, putting together the lessons with film clips and YouTube selections, poetry, and a short story.

To showcase students' learning through learning outcomes the teacher encouraged them to respond in any way they felt comfortable, providing several options they could consider (or add to), such as writing up and presenting an interview with a veteran (could be recorded), presenting a photo gallery, conducting a poetry read-aloud or poetry slam. The teacher also provided phone numbers and addresses of veterans' organizations in the area for students to visit or contact in order to thank the veterans for their service, which turned out to be an exciting and emotional activity for the students.

Assessing the Efficacy of a Learning-Centered Classroom

In a learning-centered classroom we want to constantly assess our own work and that of our students in order to inform teaching, learning, and curriculum in real time. This assessment process should be functional and continuous, regardless of outside tests that are required. If necessary, criterion-referenced tests work better because they are sensitive to content learned, but if tests can be avoided, there are better alternatives: ongoing dialogue with the learners, assessing tasks within real world contexts, dynamic assessments (interviews with students), creating short/long term personal learning goals, assessing learning outcomes (i.e., poems, paintings, music or plays written or performed, presentations, etc.), portfolios, and the ability of students to transfer knowledge from one situation to another. All of these provide important indicators of learning that teachers can use to evaluate and fine-tune instruction.

Students will learn how to monitor their own learning through instruction about the learning process and by learning how to evaluate their own strategies and levels of understanding (Bransford, Brown & Cocking 2000). Teachers can assess their own teaching and curriculum through feedback from the students and by reflecting on their own work. Real time reflections can include a 2- to 3- minute writing exercise — for students and teacher alike — at the end of every class, listing things they learned during the lesson and thoughts/questions they may have. This activity is invaluable for its efficacy in pulling thoughts together while they are still fresh in the mind and for targeting misconceptions. For example, in one of our graduate classes in the school of education, students are asked to write a short reflection "What I learned in school today" during the last three minutes of each class. At the end of the semester they write a final (ungraded) paper titled "A journey of my mind" outlining the cognitive journey throughout the semester. This paper serves the students as a reflection on their own learning process as well as important feedback for the professor in learning what works and what needs to be changed. Similarly, a portfolio final gives graduate students the possibility of selecting papers, original writing/poetry and ideas from other classes and reflecting upon them. This requires students to

think beyond the current classes and integrate information and transfer knowledge.

Conclusion

There isn't a human being who can't succeed. If he can't succeed at one thing, he can at something else. If we believe that every person has the right to succeed, we will search every route to get there.
(Amira Yahalom, Principal, Tel Aviv School
[Ben-Yosef 2003b, 270])

Realizing that *everyone* is able and willing to learn — be it the child from a foreign country or culture, a kid who refuses to look us in the eye, the class clown, the dropped-out, or those whose parents never come to the parent-teacher meetings — opens possibilities for providing meaningful educational experiences for our students. By constructing lessons on the conceptual foundations of a learning-centered pedagogy derived from the belief that all of us are worthy, competent human beings, lessons emanating from knowledge about how we learn best and predicated on active participation in learning, teachers can create safe learning environments where all students can achieve and succeed.

The most fundamental of our understandings is that learning is optimized in an emotionally, mentally and physically safe space, where everyone belongs, has a voice, and is accepted as they are. This is a space of dialogue and respect for outside knowledge, where there is a fine balance of challenge for the learners. It is a place where actions such as speaking and movement are an integral part of learning, and risk taking in thinking (making mistakes, uncovering misconceptions, and airing misunderstandings) is acknowledged as leading to understanding and growing one's mind. It is a space where teachers make every effort to know who their students are, their ways of knowing, and representation. It is a space where a partnership for learning is cultivated as teachers support and scaffold student learning through achievable steps, bridging between student knowledge and the curriculum.

Achieving success is the reward of teachers and students alike. It is a unifying framework within which feelings of safety are enhanced and motivation is engendered because when we succeed at something it makes us happy and floods us with reward chemicals and puts us in a mindset favorable to

continue trying for bigger and better goals — maybe for building the castle together, as Fred and Lulu imagined in *The Magic Toolbox*. Helping a learner find and realize success, even in small or partial instances, enhances intrinsic motivation. Compare the different reaction of a student to a teacher saying "The first half of your work is excellent, now *we* need to fix and revise the second half" with "You received a grade of 50%."

When children were first put in schools, it was for the purpose of teaching skills and information they would find necessary to manage their lives as adults. Today, in large measure, teaching has become both the means and the ends of schooling, leaving many students to find their own way as best they can once they leave school. Obviously those whose parents can afford better education, higher SAT scores, and worldwide experiences for their children, have the winning tickets. However, shifting to a learning-centered pedagogy, where learners and their learning are both focus and agent, opens possibilities of engendering learning for every student, regardless of the resources at hand or the student's perceived academic abilities, ensuring that all students have a sense of belonging to the social fabric.

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Notes

1. Dr. Ratey (2008), a psychiatrist at Harvard Medical School, equates exercise to Miracle-Gro for the brain. He describes an intensive exercise program in Naperville, Illinois, School District 3, which brought about significant changes in academic achievement for the entire district, such as a 17% improvement in reading and comprehension at the end of the semester for students in the intensive exercise program, compared with a 10.7% improvement in the control group.

2. The Life Center Lifelong and Lifewide diagram shows that about 95% of our learning is carried out in other than formal institutions, See http://life-slc.org/about/citationdetails.html

3. For a fascinating audio-visual presentation of these isues by Sir Ken Robinson, see www.youtube.com/watch?v=zDZFcDGpL4U

4. For example, *Reading don't fix no Chevys* is the title of Smith and Willhelm's 2006 book on adolescent literacies.

5. Attard et al. 2010; Barr & Tagg 1995; Ben-Yosef 2006, 2008; Heath 2001; Lave 1985; Mattar 2010; Rust 2002; Siemens 2008.

6. Although all regular, required testing is still administered, teachers and students can cull information regarding individual learning outcomes for personal development.

7. Recognizing all the while, however, that our knowledge of brain/mind functioning at this point is rarely definitive or prescriptive.

8. Comenius published the first children's textbook to teach Latin in 1658 combining printed language and pictures.