



Uncaging Creativity with Personal, Real-Life, Project-Based Education

What neuroscience tells us about unleashing the creativity of adolescent brains

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With artificial intelligence, smart machines, and robots replacing humans in predictable, repetitive tasks, the uniquely human capacity for imagination, empathy, creativity and innovation is a final frontier for humans. Uncaging students' creativity through project-based learning linked to issues they care deeply about will prepare them to build fulfilling lives and to make the world a better place for all of us.

Creativity is the fuel for an innovative society. Human creativity is a natural, expandable, and infinitely renewable resource. The adolescent mind has that spark of emotion and social drive, that push to explore new solutions to old ways, that can transform communities and may save life on our planet ([Siegel](#)). Rather than fully developing this resource, we are caging and stifling it. 76% of primary students are fully engaged in school. By high school student engagement has plummeted to 44% ([Gallup](#)). Unengaged minds are uncreative minds. High school isn't about the big, real-world problems students care deeply about. It's about surviving arbitrary, prescribed curriculum for which most students have little interest and see little relevance. Creativity is caged because students have learned not to risk the shame of giving a wrong answer. Among the students whose engagement wanes most are those with high entrepreneurial potential - *our future job creators*.

To be clear upfront, teachers are *not* the problem. We entrust our children and our future to these caring, patient, dedicated, special people. The problem is the system within which students, teachers, and administrators are all caged.

In play children pretend to be grown-ups – nurturing dolls, driving fire trucks, being super-heroes, nursing. In school we're told to stop daydreaming and focus on the day's prescribed learning objectives. Recent advances in neuroscience tell us that for learning to be meaningful and 'stick' it must be *personal*. Acknowledging and encouraging kids' dreams about their own future roles, however transient or fanciful they may seem to adults, makes school about them.

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Teachers teach, by example, what it means to be a teacher. At some point a few students have seen enough to realize that teaching is their 'calling,' their purpose, their chosen career path. Being stable, seniority-based, and unionized, teaching is an atypical career. Most career paths students will ultimately enter will be far less stable, predictable, and secure. So, how do students who imagine themselves possibly going into construction, hospitality, graphic design, health sciences, or entrepreneurship learn about these career pathways? How do students in general learn about the vast spectrum of career pathways available to them?

They don't. Moreover, the majority of in-demand career pathways to good middle-class jobs today do not require a 4-year degree, or even much of their high school curriculum. Nonetheless, students are encouraged by their teachers, counselors and parents to go to university. This well-intentioned advice leads many to substantial debt and no more clarity about career pathways that align with their interests, strengths and aspirations. The shortest, least expensive route to the majority of good middle-class is through one, two or three-year industry certification programs, often at community colleges, that can include paid internships and immediate work at graduation.

Young people's choices of life and career roles will impact 100% of their conscious hours for the rest of their life. Yet, teachers are not taught how to help students choose future roles. That task is relegated to school counselors who heroically, and hopelessly, confront the academic, social, and career challenges of, on average, 500 or more students. Being teachers first, they tend to triage academic and social issues. As a result, millions of students exit the education system each year oblivious to the daunting challenge of successfully entering today's workforce and building a happy, fulfilling adult life. Two in five 16 to 30 year-olds today are unemployed or underemployed in precarious, low wage/benefit jobs ([The Precarity Penalty](#)). Many wonder at what point they will actually become an adult. So do their parents.

In primary and secondary school students are expected to learn the answers to thousands of questions it never occurred to them to ask. Few recall the answers for long beyond the exam. Big, personal questions that engage adolescent brains are avoided, such as:

- *Who* am I now, not *what* will I be?
- Why am I here? What's my purpose?
- What are my unique strengths and talents?
- How can I be happy and healthy?
- How can I make a difference in the world?

These questions don't lend themselves to machine-readable, multiple choice exams. Nonetheless, young brains thrive on them. Adolescence (age 12 to 24) can be a golden age for innovation and creativity. The brain is not fully developed until the mid-twenties - long after all other organs. This is a period of tremendous brain malleability and neuroplasticity, the term scientists use to describe the brain's intense sensitivity to its environment and its ability to reorganize itself by forming new neural connections ([Steinberg](#)). In supportive, nurturing, purposeful environments adolescents have the capacity for prodigious accomplishments, far beyond the limited expectations of the education system.

Adolescence is an essential time of emotional intensity, social engagement, and unbounded creativity ([Siegel](#)). We remember the school play, the robotics project, the school newspaper, the young entrepreneurs project, skills competitions, financial literacy challenges, student exchanges, youth service - hands-on, real-world activities - lifelong. Art, music and physical education, engage adolescent brains. Whether skate boarding, playing the guitar, chess, hockey, cross word puzzles, or hacking,

whatever the brain focuses on long enough, it gets better at. Neurons that fire together wire together ([Walsh](#)). During adolescence we need to create environments for students to find their 'sparks.' A spark is something that lights up an adolescent inside and gives purpose to his or her life. Kids who thrive have two important qualities: They know what their sparks are and they have adults who encourage and support them. ([Walsh](#)).

Adolescents need to know they can tap incredible talent and potential within. Each has her or his own personal head-held device more powerful than any supercomputer, capable of imagining *anything* and mastering more than they can imagine. Three elements are essential to developing talent of any kind:

1. Envisioning and believing in your dream
2. Deep practice which enhances the brain's neural pathways
3. Good coaching from experienced, supportive, patient, wise sources ([Coyle](#))

Stars, in every realm and walk of life, are made not born ([Coyle](#)). They are supported by adults who care enough to do the hard work of creating experiential, project-based learning environments that allow for mistakes, for exploration, for humor, spontaneity, and *fun*. We must incubate talent and grow the strengths of individual students, not force-feed them pre-determined, age-based, arbitrary subject-matter they will soon forget, that causes stress, takes far too much time, and crushes curiosity and passion for learning. Great teachers set free the idealism that lies coiled, waiting to be sprung, in every young person ([Coyle](#)).

For learning to 'stick' it must be linked to issues about which adolescents care deeply. Their brains thrive on rigorous, multi-faceted, collaborative projects with real-world themes, like entrepreneurship, climate change, cultural tolerance, poverty reduction, etc., that require them to step out of their comfort zones to create and present their own solutions. Academic subjects should be blended into these projects.

An open and excitable brain can also suffer in powerful and enduring ways when exposed to stress, anger, fear, humiliation, or boredom ([Jensen](#)). Bullying, by siblings and peers is damaging, but by authority figures like parents, teachers, and coaches is much worse. Shame - of the red mark, the dreaded X, the lost point, the wrong answer, the lowered grade, the failed year, being benched - is a dream killer ([Fraser](#)). It amplifies our fear of fear, keeps us from contributing, and short circuits our willingness to explore. When a brain circuit is not used, its connections become weaker and weaker. Axons retract, spines die off, and as a result, synapses start to disappear, even to the point that the circuit finally ceases to exist. This process is called synaptic pruning or withering ([Steinberg](#)).

We need to instill in students the confidence, courage, and creativity to try new ideas and reach higher. They will inevitably make mistakes. Neuroscience tells us this is precisely how we learn and how our brains grow. If we are not making mistakes our imaginations are not fully engaged with the issue, we are not being creative enough, we're not learning, and our brains are not growing.

We all live in two worlds: the external world that was here when we arrived, and will be after we are gone, and the internal world, which is unique to each of us and includes our fears, hopes, and dreams. The second world often gets forgotten in education. Each student deserves to be treated like the miracle he or she is—with personalized, individualized education that addresses her or his inner world. The shift to personalized, real-world, project-based learning is non-negotiable if education is to truly help students reach their potential ([Robinson](#)).

Social reorganization of work in the 21st century requires a fundamental reordering of career development theory and practice, as well as the tenets underlying the education system. The idea of actualizing a core self that already exists is giving way to the view that an essential self does not exist *a priori*. Instead, constructing one's self is a lifelong project. We are stories unfolding, dreams becoming, stars being born, not pre-cast objects defined by a list of traits an assessment can identify ([Savickas](#)). Yet, if students do get career assistance, it is often in the form of quick, one of assessments of interests, personality type, or values.

Online career exploration and planning systems, with support and encouragement from teachers and parents, help students identify potentially viable career pathways. But until they experience the work environment first-hand, and meet people doing what they imagine themselves doing in the future, they lack sufficient information to make informed decisions. Too many future nurses, veterinarians, lawyers, etc., discover undesirable aspects of their intended career *only after* they have amassed student loan debt and wasted months or years in an inappropriate program. Work- and community-based learning 'experienceships' (job shadows, internships, co-op placements, summer jobs, volunteering, etc.) in elementary and secondary grades enable students to gain essential real-world knowledge to inform their career decisions. They also learn and practice skills they will need in work and life.

Adolescence, and brain development extend beyond the 'school years.' A significant delay between graduation and finding satisfying work can precipitate mental health challenges. A 2012 University of Michigan [study](#) showed precarious workers are five times more likely than those in secure jobs to be at risk of depression and three times more likely to report having an anxiety attack in the past month. Research from [Sweden](#) suggests precarious work has a 'scarring effect' on young people's long-term mental health. Stress, unhappiness and an unhealthy home life are the biggest consequences of precarious employment, according to a new survey of more than 4,000 workers by the [Ontario Federation of Labour](#). Stress about finding good work and 'adulting' has precipitated an increase in mental health and family issues with profound social, economic and healthcare costs.

The trend toward a '[gig economy](#)', where temporary jobs are common and employers contract with independent workers for short-term engagements, is well underway. [Intuit Inc.](#) predicts that by 2020, 45 percent of workers will be freelance contractors. Success in the gig economy demands an entrepreneurial mindset. All youth need to learn entrepreneurial and financial management skills that include the creativity to come up with new ideas, the courage, confidence, and communications skills to sell their ideas, and the initiative, grit, and team skills to make them happen. These skills will serve all youth well with any employer and empower them to create their own work.

When the latest advances in neuroscience and current workforce and societal trends are juxtaposed, the case becomes compelling for a paradigm shift in education to personalized, project-based, real-world learning. This is 'learn-by-doing' curriculum that integrates core subjects with real-world problems that need to be solved. Teachers work in teams to identify key standards and skills to be addressed. Then, they work backwards to plan their curriculum, striving to create engaging interdisciplinary projects that center on a 'big idea' with real-world connections that are rigorous, relevant and meaningful to students' lives. Local employers and community partners play vital roles by helping align and connect projects to industry expertise and standards and to real community challenges. Parents, play all-important coaching and supporting roles.

Students work in teams to create a final product that demonstrates mastery of content standards and acquisition of key 'soft skills' such as critical thinking, collaboration, and communication. One of the

most important aspects of project-based learning is a public presentation of the work created. Assessment is based on the student's ability to articulate and demonstrate the content and skills learned. Student progress is measured and assessed through traditional tests and quizzes, public presentations, exhibitions, and digital portfolios.

More and more school systems are introducing project-based learning, often aligned with [career clusters and pathways](#). Regional and national coalitions are forming to speed the transition to project-based learning. Examples include:

- [Coalition for Career Development](#)
- [Pathways to Prosperity Partnership Network](#)
- [Linked Learning Alliance](#)
- [Pathways Systems Model](#)
- [Coalition Transitions Canada](#) (proposed)

Canada can be among world leaders in transitioning to personal, real-world, project-based learning. But this won't happen with diverse public and indigenous education systems attempting to discover the way forward independently. [Coalition Transitions Canada](#) is a proposed not-for-profit 'coalition of the willing.' Its mission is to foster the genuine collaboration needed among diverse contributors across the country to improve and scale current best practices and address gaps where we are failing to adequately prepare students to transition from school to adulthood. Participation will be open to any organization willing to leave egos and competitive instincts aside to better prepare all Canadian youth, including first peoples and new arrivals, for success in career and life.