ENHANCING TEACHER EFFICACY: RESEARCH AND IMPLEMENTATION OF BRAIN-BASED PEDAGOGY FOR EDUCATORS OF ADOLESCENT LEARNERS

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Dedication

Do the best you can until you know better. Then when you know better, do better.

—Maya Angelou

This project is dedicated to my husband, Bryan, and our two sons, Liam and Sean. Without their unwavering support for all my endeavors, I would never have been able to sustain the focus and the passion to complete what I had begun.

This project is also dedicated to my students, both past and present, who gave me the *inspiration to learn more so that I might be more* for them.

Finally, this project is dedicated to my fellow teachers, colleagues in arms, and trail buddies, without whom there would be no project; it is because of you the idea of creating a resource repository for junior high school teachers was conceived.

Abstract

Adolescence is a time characterized by immense physical, emotional, and social changes (Blakemore, 2018; Siegel, 2011). It is a period in which there are significant differences in neural structures, directly affecting the way adolescents learn and respond to traditional instructional strategies (Blakemore, 2018; Siegel, 2013). Contrary to popular opinion, the adolescent brain is not a dysfunctional adult brain: it is quite literally wired differently, with a unique structure and function, necessary for adaptation to specific environmental contexts and geared for social survival (Blakemore, 2018; Cozolino, 2013). The adolescent brain is sensation seeking, risk taking, and reward driven; it is sensitive to social threat and dominance hierarchies, self-consciousness, and alert to social risk appraisal, and it is hyper-responsive to social influence such as status and respect (Cozolino, 2013; Yeager, Dahl & Dweck, 2017). It is a brain uniquely situated to challenge social norms, question purpose, and seek meaning and connection. The project, a web-based repository of resources, provides essential knowledge and practical resources for all educators who work directly and indirectly with adolescents. It explains how the adolescent brain is wired differently, how teachers can use this knowledge in instructional design, and why adolescence is considered a "second window of opportunity" in neural development (Dahl et al., 2017).

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Introduction

My career in education began as an educational assistant (EA) working with neurodivergent students in a public elementary school. This was in an era of compliance-focused education in which, I am ashamed to say, seclusion rooms and physical timeouts were common practice. As a new EA, I had no formal education, and received no prior training to prepare me for the complex needs of my students. A Google search querying Asperger Syndrome (Autism Spectrum Disorder) and Fragile X Syndrome was the only background knowledge I had going into my employment. I received on the job training from other non-certified EAs in the building; this training was based on their own prior experience of what worked (i.e., what got the desired results, which was, in this case, compliance). I was subsequently trained in the art of reward economies, token systems, time-outs, physical holds, and other authoritarian practices that are no longer considered best practice in public schools.

My next role as an EA was working in a junior high school segregated program with adolescent boys. Most of these boys did not have diagnosable conduct disorders, however, they all experienced significant difficulty with the academic and behavioral expectations of the classroom, and they were angry. These boys all came from households with low socioeconomic status (SES), they all had what they described as rough home lives (conversations about who had it worse were common), and they were unified in their hatred for school. They openly discussed which teachers they despised, and which teachers they could tolerate. As an EA, I was tolerated, and over time, even accepted (owing largely to my own unique upbringing in the same community, in which I grew up with many of their relatives). I eventually got to know the boys well enough to learn that behind the rage they were kind, empathetic, and generous kids who wanted to do well. As an EA trying to support these students, I cared deeply but was completely

undertrained and underqualified, feeling overall powerless to help these boys succeed outside of our segregated classroom. We were all frustrated and no one was thriving in this environment.

My experiences as an EA inspired me to take steps towards improving my teaching efficacy. I knew that to support the kids that I cared about I needed to improve my knowledge and skills, but I also needed to have the power to make changes that I thought would better meet their needs. Opportunity came in the form of the Teacher Education North (TEN) program at Grande Prairie Regional College (GPRC) and, for the next two years, I drove the 200 kilometer round trip from my home in Fairview to Grande Prairie to finish my Bachelor of Education. Throughout the professional journey that followed, I have continued to seek the knowledge and skills that would improve my teaching efficacy. I have enthusiastically consumed professional learning and development opportunities that were student-centered and supported my philosophy of education —one rooted in respect and accountability. My experiences as an EA, and my memories of power struggles, elementary seclusion rooms, and the deep-rooted adolescent hatred of the education system, informed my teaching practice. I felt compelled to do it differently.

Professional Background and History

In my elementary classrooms, I strived to create inclusive communities based on respect, that honored diversity, and encouraged a positive attitude for learning. Every year the first days of school were spent collaboratively developing a class mission statement, establishing the expectations and conditions for learning, and participating in fun challenges. In this way, we collectively created a learning community and established a foundation in which students developed perseverance and accountability through teamwork. I initiated classroom project-based learning opportunities that created community connections (The Fish in Schools Program) program, whole school initiatives to promote empathy and respect (Bucket Fillers) and was

actively involved with the Alberta School Athletics Association as a Coach, Athletic Director, and Ranking Committee member. However, one cannot sustain change without a school wide system of support, and I began to burnout.

Opportunity arose again when I was asked to become an Inclusive Education Coach (I-Coach) at the Junior/Senior High School where I was once an EA. While I was hesitant to accept a position that took me out of the classroom, I hoped it might allow me an opportunity to initiate the changes I felt were needed back when I was an EA, so, I accepted the position and returned to my old school, now in a new role, with more leverage to create positive change. The first change was to remove the physical space where, eight years earlier, I had worked in a segregated classroom with the boys. The physical change was a necessary first step, however, it would take more for the idea of inclusion to take root with the teachers who had been there for decades and had received their teacher education in a much different educational climate.

Resistance to the type of change I wanted to implement was expected (see resistance theory explained by Scalise & Felde, 2017, p. 178-185), however, I was confident that a paradigm shift was possible. The research supporting progressive education was substantial, and I knew that all of the teachers on staff cared for the kids they taught, so surely it was simply a situation in which the message needed to reach the masses. Unfortunately, it was not so simple. This particular environment was not yet receptive to change. It was stressful to be a teacher in this school and my altruistic attitude was met with skepticism. Most of these teachers had already experienced iterations of the next big idea in education and would require more than, what they saw as, the assertions of an elementary school teacher armed with theory and limited experience, to convince them that change was possible or even necessary.

Once again, I was in a position where my knowledge and skills were not adequate to support my students (in this case, teachers). As an I-coach, I was expected to support teachers in inclusive pedagogy, yet my professional training was inadequate for the role. I was competent in the application of best-practice and the creation of student-centered learning communities in my own class; however, I was not prepared to educate or support colleagues who were entrenched in the infertile mindset of "we have always done it this way" (Grace Hopper, computer scientist, mathematician, and U.S. Navy Rear Admiral, is famous for claiming this to be the most dangerous phrase in the language). Understanding this dilemma, I began to seek more professional learning to bolster my efficacy in this new role.

It was at an inclusive education conference that I learned of a professional learning opportunity that would be instrumental in molding my professional career, a Master of Education with a focus in teaching, learning, and neuroscience. Neuroscience! I was intrigued by the opportunity to not only improve my own understanding and practice of teaching, but to learn the biological underpinnings of how human beings learn. I also considered how I could use this knowledge to help other teachers reframe their own pedagogical thinking and change instructional practices. And so began a learning journey, culminating in this, my final project.

Rationale and Purpose

Rationale for pursuing a final project rather than a capstone paper was inspired by the memory of my experiences as an EA, a teacher, and an I-Coach. I was an educator who needed access to science-based information to inform my practice, and proven strategies to use with my students. I became part of the educational system in order to help kids, but, despite the best intentions, lacked the knowledge, skills, and even the attitude to do well. Good intentions are simply not enough, and even well-intentioned actions can cause harm when contextual

understanding and proper training is absent. I still cringe when I think of my early years as an EA and the barbaric practices I was part of. I would like to absolve myself by extolling my ignorance at the time, however, when dealing with the lives of children, ignorance is not an excuse.

Consider the following analogy. There once was a time when my much younger self was confident that she could perform a tracheotomy on a choking victim if she needed to (I once saw it done on TV with a Swiss Army knife and a Bic pen). However, without the required medical background, training, and surgical tools, she would most certainly botch the job. The patient might live, however, there is a more than likely chance they would succumb to her good intentions. And if they did miraculously survive her medical administrations, they would most certainly have had better results, and less scaring, from a qualified medical professional. Although extreme, I believe it to be an apt analogy when considering education today and the young lives we have responsibility for.

Teaching is one of the most important, humanitarian, professions one can have. Teachers have a tremendous impact on the lives of their students, and children are humanity's most important resource. Ergo, the metaphor of an unqualified but well-meaning citizen performing an emergency medical procedure with makeshift tools is very similar to a well-meaning, but under qualified teacher, implementing ineffective, and at times damaging, educational practices (seclusion rooms and physical time outs are thankfully no longer commonly accepted practices). The patient represents, of course, our students who need specialized care or targeted interventions. These are the kids who might survive public education, but more than likely not, will fail to graduate and wear the scars from their educational experiences for a lifetime.

This analogy is particularly relevant to education during the adolescent years, a time of opportunity, but also vulnerability (Dahl et al.). Teachers in public schools are not equipped to meet the diverse needs of students in many of our Junior High Schools. I have witnessed elevated student dropout rates and absenteeism, poor academic performance, and persistent behavioral problems in the classroom. I have experienced, and watched colleagues struggle with frustration, stress related health conditions, and burnout. I work within an educational system often characterized by malaise, in which high rates of teacher attrition and student despondency indicate that current pedagogical practices and educational structures are not effectively supporting students or teachers in secondary schools. Evidence for the need to develop and cultivate caring relationships and positive school culture is clear, however, this is often challenging in a resource depleted system that struggles to equip teachers with the knowledge and training that they need (Cozolino, 2014; Craig, 2017; Katz & Lamoueux, 2018; Nagoski & Nagoski, 2019).

My experience has shown me that few traditional interventions consider the unique developmental stage of the adolescent brain, the social neuroscience of education, nor the emotional reciprocity of teaching and learning. Despite overwhelming evidence supporting the need to develop effective, science-based interventions specific to adolescents, little training or support in this area has been provided to secondary school educators and that is something that needs to be rectified.

The purpose of this project is threefold. First, to provide teachers with the science-based knowledge necessary for teaching adolescent learners. Second, to promote respectful attitudes about teaching adolescent learners, that support pedagogically sound educational environments, in which teachers and students can thrive. The final goal of the project is to empower teachers

with practical tools and strategies they can use in their own teaching context. I understand the challenges of implementing new ideas and ways of teaching and learning, however, when provided with the knowledge, the reasons, and the tools to do it differently, teachers will be more equipped to risk trying something new and potentially reap the rewards of pedagogical change.

Project Description

Earlier this year, I was asked to provide a Professional Development (PD) session on adolescent neurodevelopment to teachers. Reflection after this session revealed that, once teachers have been provided with the background knowledge of neuroscience and the unique neurobiology of the adolescent brain, the psychology and the theory behind adolescent motivation and engagement, and the pedagogical requirements for the educational environment and instruction, they also need specific, practical classroom strategies based on these principles. Reflection also revealed that viewing the topic through the lens of Self Determination Theory (SDT), and the fulfillment of the basic psychological needs of autonomy, relatedness, and competence, was an effective way to chunk the information (Ryan & Deci, 2017). SDT is a fairly recent theory of human behaviour that aligns science with traditional First Nations ways of teaching and learning and provides a framework for evaluating pedagogical practices in a holistic way. Most educators will agree that an important goal of education is to promote the cognitive and social growth of the next generations, however, it is vital not to lose sight of the person within the student (or the teacher) and their very human need for self-actualization. SDT and traditional First Nations holistic teaching shift the focus from teaching content to teaching people, which, for some teachers, may require a commitment to change.

Change is difficult, even when you are committed to it. Many, including myself, have experienced the frustration of attending amazing PD opportunities that inspire us to try

something new only to have that passion extinguished by the realities of our teaching context, we simply do not have the time to plan and implement new strategies, particularly if we don't see immediate results. Change is a front-loaded effort that we do not always have the capacity for, so we resist it by tabling our good intentions and go back to doing what we have always done simply because it is known and safe (Scalise & Felde, 2017). Aoki (2005) calls this dilemma the indwelling between curriculum as planned versus curriculum as lived; it is a psychological and emotional space in which all teachers navigate daily expectations by attempting to reconcile theory (what they want to do) with reality (what they can do). This stressful indwelling demands compromise and acquiescence that can be the antithesis of thriving.

The intention of this project is to promote thriving junior high schools. This requires careful consideration of the realities of junior high school students and teachers, and their needs. There is no question that teachers need access to information, they also need the freedom to learn in their own time and the autonomy to pick and choose what is relevant to their context. With this in mind, I decided against the original project idea—a targeted PD session that provides a lot of good information but loses salience over time—and elected to create a depository of science-based knowledge, sound pedagogical practices, and practical resources housed within an easily accessible website called, "So You Teach Junior High? Adolescent Neurodevelopment: Essential Knowledge and Practical Resources for Teachers" (http://sites.google.com/view/soyouteachjrhigh).

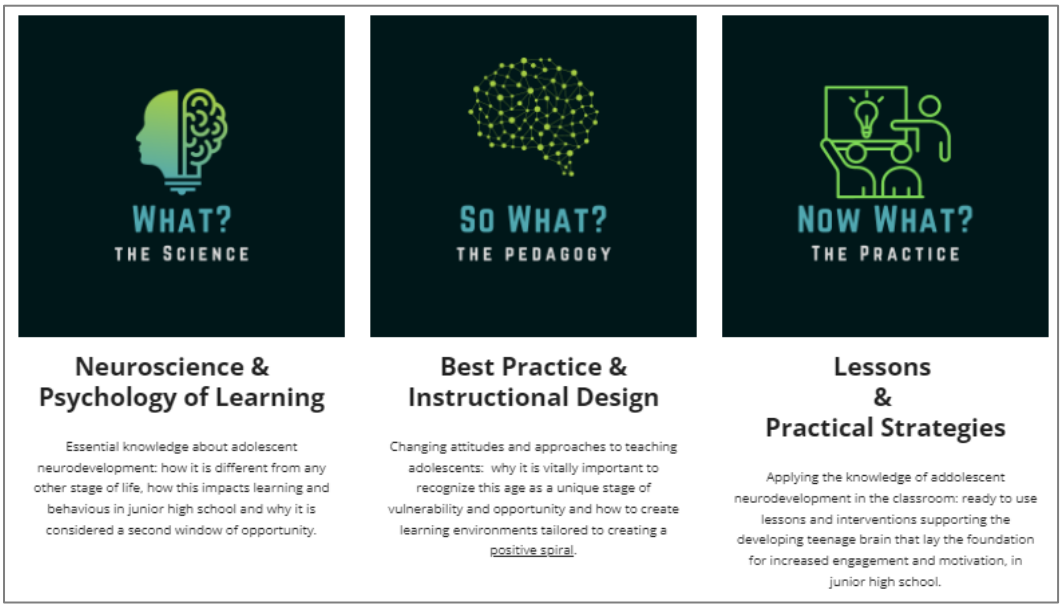
The "So You Teach Junior High" website will furnish teachers with the resources to impact positive change in the lives of our adolescent students, now and into their adulthood, and promote thriving, for both students and teachers in junior high school. The site contributes essential knowledge and practical resources for all educators who work directly and indirectly

with adolescents. It explains how the adolescent brain is wired differently, how teachers can use this knowledge in instructional design, and why adolescence is considered a "second window of opportunity" (Dahl et al., 2017) in neural development.

There is an immense amount of information and resources on these pages, however, I have attempted to organize the information into digestible chunks, rather than overload teachers' already full plates, that will add value to teachers' educational experience. The site has been structured in three parts. *Part One* provides resources to explain how adolescent neurobiology differs from childhood and adulthood (the what). *Part Two* describes how to use this knowledge to tailor instructional design and create engaging lessons (the so what). *Part Three* gives teachers practical strategies and lessons that work with adolescent students to build essential brain architecture that will lay a foundation for future success (the now what). A screenshot of the home page is presented in Figure 1.

Figure 1

Screenshot of "So You Teach Junior High?" website homepage.



Literature Review

Teaching junior high school students offers unique challenges not experienced in elementary or high school classes. When asked, “where do you teach?” The response to “I teach junior high” is almost universally one of incredulity or sympathy. This all-too-common reaction reflects a lack of understanding of the biological nature of adolescent development. Despite common misconceptions that adolescents are “big kids” or “small adults”, scientific evidence tells us that adolescents are in a unique stage of biological and neurological development in which teaching and learning strategies that are effective with younger children and adults, are not nearly as efficacious (Blakemore & Mills, 2014; Cozolino, 2013; Craig, 2017; Kolb et al., 2019; Yeager, Dahl & Dweck, 2018). The literature supporting the need for teachers to understand the neurobiology of adolescence, and how it relates to teaching and learning is substantial. It is also essential that teachers, and schools, adopt a shared understanding of the purpose of education and a common definition of what it truly means to thrive in the educational setting.

Adolescence Defined

In the book, *Inventing Ourselves: The Secret Life of the Teenage Brain,* cognitive neuroscientist Blakemore titles the first chapter, “Adolescence Isn’t an Aberration” (2018, p. 1). In doing this, she sheds light on commonly held beliefs that adolescence is an anomaly or deviant stage of life and illuminates the tendency for disrespect and mockery of adolescence that permeates our culture. While we can agree that adolescence can be a difficult time for everyone involved, and is often characterized by unpredictable behaviour, egocentricity, and miscommunications, science has proven that the adolescent brain is not defective, nor is it unpredictable, and it certainly is not something to be ridiculed (Blakemore, 2018). It is, in fact, a very necessary and sensitive stage of development in which neural pathways are malleable,

social motivation and sensitivities are heightened, and an identity or sense of self is in a formative phase (Blakemore, 2006, 2018; Siegel 2011).

Adolescence has been traditionally thought of as the teenage years and defined chronologically as the second decade of life, however, researchers today recognize adolescence as a stage of physical, psychological, and social development beginning with a biological onset, referred to as puberty, and ending with a sociological offset, the point in which one assumes an independent and stable role in society (Blakemore, 2018; Yeager, Dahl & Dweck, 2018). This somewhat arbitrary definition is necessary when one considers the variable individual, social, and cultural influences that shape our development. For some individuals, puberty can begin as early as nine years old, or as late as fourteen. In some cultures, youth are expected to assume adult roles in the workforce or as parents while still in their teenage years whereas, in other cultures, these roles are typically delayed by full-time education or by continuing to live with parents well into the late twenties.

Contrary to common opinion, the adolescent brain is not a dysfunctional adult brain. It is quite literally wired differently, with a unique structure and function, necessary for adaptation to specific environmental contexts and geared for social survival (Blakemore, 2018; Cozolino, 2013). The adolescent brain is sensation seeking, risk-taking and reward driven; it is sensitive to social threat and dominance hierarchies, self-consciousness, and alert to social risk appraisal, and it is hyper-responsive to social influence such as status and respect (Cozolino, 2013; Yeager, Dahl & Dweck, 2017). It is a brain uniquely situated to challenge social norms, question purpose, and seek meaning and connection.

Adolescence is a necessary, formative, process in which the development of identity, or sense of self, emerges through the invention of the social self and how we are seen by others

(Blakemore, 2018; Seigel 2011). This metamorphosis can be incredibly stressful for everyone involved; the adolescent, who is "driven by rising hormones, dysregulated neural system, and destabilized frontal lobes" (Cozolino, 2013, p. 34), parents who experience the heartbreak of bearing witness to the reshaping and reprioritizing of attachment bonds formed during infancy and childhood (Blakemore, 2018), and teachers who often struggle to motivate and engage adolescents in learning opportunities that will help them develop the skills for success in life. In order to abate frustration, it is essential to reframe our understanding of adolescence and appreciate that, while this stage is temporary, it is also a sensitive time of opportunity and vulnerability in which adolescent capabilities for thriving can be supported, or thwarted, by the adults in their lives.

Creating Capabilities in Education

What is the goal of education? Each school has their own mission and vision statements reflecting their values and purpose. In my school, we are a "learning community that experiences success by challenging the potential of all who come through its doors" (https://www.fairviewhigh.ca/about). Across town, the vision of the elementary school is to be "an inclusive, inspiring, learning focused community that equips students for their most successful future" (https://www.eeoliverelementary.ca/about). If you compare a large sample of school mission and vision statements, I suggest that most will say something about community and preparing students for a successful future.

Economist Margaret Nussbaum (2006, 2012) suggested that the role of public education is to enable people to live full and creative lives, and prepare them for democratic citizenship, by supporting the development of their internal capabilities for critical thinking, relatedness, and imagination. In her book, *Creating Capabilities: The Human Development Approach* (2012)

Nussbaum describes a theory of economics based on the principles of Amryta Sen (1974) which focuses on the human development of internal capabilities and the environmental forces (external capabilities) that can support or thwart their realization. Internal capabilities include one's beliefs and values (mindset), wellness (physical, mental, and emotional) and cognitive abilities. External capabilities include the social, political, familial, economic, and environmental contexts in which one has the capacity to choose or access their internal abilities. Nussbaum posits that progressive education should not only focus on, but also establish the conditions for, the "development of young people's capabilities through education focusing on critical thinking, world citizenship and imaginative understanding." (2006, p. 385)

Teachers might not agree that it is their place to question the beliefs and values of their students (either because they support their own beliefs and feel they don't need to be challenged or because they don't support them but are not at liberty to tell students what to think —both of which are valid reasons), nor does Nussbaum. She suggests that it is not the role of teachers to teach *what* to think, but *how* to think critically about their choices and decisions. Nussbaum (2006) describes critical thinking as:

> This means a life that accepts no belief as authoritative simply because it has been handed down by tradition or become familiar through habit, a life that questions all beliefs, statements, and arguments, and accepts only those that survive reason's demand for consistency and for justification. (p. 388)

This innate drive to question authority is something adolescent brains are wired to do, and something teachers can harness within an educational framework of structure and purpose (Yeager, Dahl & Dweck, 2022).

While most schools and teachers can agree that community is an essential condition *for* learning, Nussbaum (2006) also suggests that it is an internal capability that is the result *of* learning. She advocates for education that nurtures students' "ability to see themselves as not simply citizens of some local region or group, but also, and above all, as human beings bound to all other human beings by ties of recognition and concern" (p. 389). Cozolino (2017) describes this as having "two sets of layered social instincts" the first of which are "primitive instincts rooted in the blood connection of family and tribe" and the second, "a modern addition that connects in larger groups based on more abstract loyalties" (p. 8). The adolescent brain is a social brain —wired to seek connection and create a personal identity from how we are seen by others (Blakemore, 2018; Cozolino, 2017; Seigel, 2011)— and uniquely sensitive to development of connection and empathy. Thus, the need to create supportive, respectful, learning communities and environments that celebrate diversity not only create conditions for learning, but provide essential conditions for the development of adolescent identity (which we will discuss, also has significant impact on motivation and engagement).

Communities are bound together by stories. In the adolescent brain, narratives are essential for the neural integration of many processes, including affective and cognitive processes important in memory, learning, behaviour, and self-identity (Cozolino, 2013). Nussbaum (2006) suggests that progressive education supports the development of a narrative imagination:

> This means the ability to think what it might be like to be in the shoes of a person different from oneself, to be an intelligent reader of that person's story, and to understand the emotions and wishes and desires that someone so placed might have. (p. 390)

Siegel (2011) calls this ability mindsight, and Blakemore (2008, 2018) refers to it as mentalizing or theory of mind. Regardless of terminology, mentalizing is a necessary process of the social brain involved in understanding others, developing empathy, and understanding oneself.

Nussbaum's view of progressive education and the role of education to support the creation of a thriving community through the development of internal capabilities aligns with experiences that also support adolescent development. The question then becomes, can the external environmental, social, and political conditions in a junior high school be tailored to support thriving. I believe the answer is, of course, yes. But not without deliberate planning and a contextual understanding of what it means to thrive.

Thriving in Junior High School

Thriving is, at its heart, a subjective concept not easily defined, however, the following definitions echo Nussbaum's capabilities theory and lend clarity to the concept of thriving as both a process and observable condition. Benson and Scales (2009) describe thriving as "a multidimensional construct" (p. 92) and a dynamic process in which there is a bi-directional relationship between a person and their environment. Brown et al. (2017) suggest that "thriving can be observed through the experience of a high level of well-being and a perceived high level of performance" (p. 169) in which personal attributes (personal enablers) and environmental conditions (contextual enablers) work in tandem to create conditions for thriving.

The enablers of thriving suggested by Brown et al. (2017) can be aligned with Nussbaum's capabilities. They include personal enablers (internal capabilities) of a positive perspective, religiosity and spirituality, proactive personality, and motivation (beliefs and values); psychological resilience and social competencies (wellness); and knowledge and learning (cognitive ability). Contextual enablers (external capabilities) include a challenging

environment (environmental); attachment and trust (social); family support (familial); colleague and employer support (political).

The common thread between Nussbaum's capabilities approach (2012) and the conceptualization of thriving by Benson and Scales (2009) and Brown et al. (2017) is that thriving is both a process and a function of doing well with what you have within your environment. Ryan and Deci (2017) flavour this concept with, arguably the most theoretically debated ingredient for human thriving, autonomous choice. They posit that wellness, motivation and development is the result of the fulfillment of the basic psychological need for autonomy, which is informed by the, no-less important needs, for relatedness and competence.

I believe the ability to determine for oneself, that which one needs or desires, is central to the creation of personal identity. Yet, choice must be informed through the building of competence, which in turn, is only possible through mentorship. "SDT is an empirically based, organismic theory of human behaviour and personality development" that "examines how biological, social, and cultural conditions either enhance or undermine the inherent human capacities for psychological growth, engagement, and wellness" (Ryan & Deci, 2017, p. 3). Self-determination is another essential component of thriving, particularly during adolescence, when the brain is integrating and strengthening neural pathways essential to the development of the mind and the creation of self-identity. The adolescent brain is wired to thrive by seeking autonomy through questioning authority, developing competence through experience, and seeking connections with non-parental adults and peer groups through belonging (Blakemore, 2018; Seigel, 2012).

Comprehension of the complexities of the adolescent brain, appreciation for a shared purpose of education, and a contextual understanding of thriving are essential elements in

creating the conditions for learning in junior high school. It requires an investment in student and teacher well-being through a commitment to pedagogical planning that provides the contextual conditions for wellness, and the implementation of strategies that bolster the internal capabilities to lead full and creative lives.

PART 1: The Science

Science is the foundation of this project. I have been very fortunate to study the neuroscientific underpinnings of brain development and how we learn, grow, and adapt due to experiences and this knowledge has had significant influence in my teaching practice. It has challenged previous misconceptions, given reason to effective strategies and pedagogical best practices, and inspired a change in my attitude towards teaching and learning, particularly in the adolescent years. Kolb from the University of Lethbridge asserts that teachers "need to know about the principles of brain development in order to understand the impact these processes have on behaviours" ("Neuroscience research in the classroom", n.d.). Knowing the science behind teaching, learning, and behaviour informs our practice and the bridge between science and education has become a new field of study in itself, "neuro-education" or "educational neuroscience" (Muelas et al., 2021).

Educational neuroscience is of particular importance for teachers who have diverse student populations with different capabilities and cognitive, sensory, and social-emotional needs —that is, every public school teacher at every grade level. It is therefore crucial that an accurate understanding of the most current scientific research is formed so that the science can inform the pedagogy. While teachers, such as myself, hunger for the scientific underpinnings of our profession, we are not scientists. The gap between scientific understanding and practical classroom application is vast and, as such, can lead to the scientific misunderstandings or

oversimplifications called neuromyths (Dekker et al., 2012; Muelas, 2021; Scalise & Felde, 2017).

Neuromyths are prevalent in education, the most common of which are the myths about critical periods of brain development, the age of 3 being a cut-off period of neural development, left versus right brained people, or the 10% use of our brain (Muelas, 2021). “The influence of these myths in the classroom is problematic because it wastes money, time, and effort, which could be better spent on the development of evidence-based practice” (Dekker et al., 2012). It also risks perpetuating potentially damaging attitudes towards teaching and learning — particularly in Junior High School where the myth that adolescents should arrive with social, emotional, and organizational skills already intact and fully developed persists.

The Adolescent Brain and Neural Plasticity

Blakemore (2018) defines plasticity as “the brain’s capacity to adapt to changing environmental stimuli” (p. 90). She emphasizes that this phenomenon occurs all of the time, whenever learning takes place, without an age limit. It can be differentiated from brain development, which occurs in childhood and adolescence, by thinking of plasticity as two types: experience-dependent and experience-expectant. Whereas our brains, regardless of age, change with experience (such as meeting someone new, learning a new skill, or tasting a new type of food), it is only in certain ages, sensitive periods of neural development, that the brain is primed to expect exposure to sensory input. An example of experience-dependent plasticity is the requirement of infants to be exposed to sounds of language in order for them to develop the sound perception necessary to understand and speak their language properly (Gibb & Kolb, 2018).

Contrary to the neuromyth of sensitive periods of neural development being limited to early childhood, Blakemore (2018) posits that experience-expectant plasticity continues into adolescence in specific brain regions responsible for certain cognitive functions. This theory is supported by fMRI scans in which evidence of significant structural changes in the prefrontal cortex of adolescents coincide with the development of cognitive processes such as reasoning, planning, emotional control, and social intelligence (Cozolino, 2013, Yeager, Dahl, & Dweck, 2017). This sensitive period of neural development has been accepted as "a second window of opportunity" (Dahl et al., 2017) for the development of cognitive functions such as Executive Function (EF) skills, and Social Emotional Learning (SEL), that may not have developed normally during childhood.

Other neurological changes during adolescence include "a peak in the availability of dopamine, the brain chemical neurotransmitter that supports motivation" (Padmanabhan & Luna, 2013 as cited by Dahl et al., 2017, p. 31), suggesting a heightened motivation in the reward system of the brain. This is a contributing factor to why adolescence is often characterized by risky behaviour (Blakemore, 2018). An enhanced reward sensitivity combined with plasticity in the prefrontal cortex, including the anterior cingulate – an area associated with empathy, decision making and impulse control (Greenstone, 2011), has profound implications for how adolescents interact with their environment.

Yet another significant aspect of adolescent neurobiology is an elevation in the levels of cortisol, the stress hormone (Dahl et al., 2017). Increases in cortisol create an alert brain, always ready to react to threats in their environment, real or perceived, however, it is unclear if the elevated levels of cortisol in adolescence are the reason for, or the result of, stress exposure (including social stress) during adolescence. While a reactive brain may have been helpful

historically, it is not always beneficial in our modern world as stress exposure and an increased sensitivity to stress-induced glucocorticoids during adolescence may be linked to psychiatric disorders such as anxiety, depression, substance-use, schizophrenia, and other mood disorders (Blakemore & Mills, 2013).

Adolescence is a critical period of development when the brain is primed to adapt and evolve, and the nature of the experiences in the life of an adolescent can have significant influence on their futures in both positive and negative directions (Dahl et al., 2017). The implications of these findings are profound in terms of educational support and interventions for junior and senior high school students. Adolescence is a "window of opportunity … a developmental inflection point when small positive changes in these developing systems may have a larger and more enduring impact – creating better opportunities to leverage change" (Dahl et al., 2017, p. 21). However, negative experiences may also have similarly enduring effects.

Executive Function

A typical school day for an adolescent student puts immense pressure on their ability to exercise complex EF skills. In an environment that can be challenging or even threatening, students are expected to learn a vast array of knowledge and skills, all while navigating substantial hormonal, physical, and neurological changes. The Harvard Center for the Developing Child characterizes adolescence as a time when "EF skills are not yet at adult levels, but the demands placed on these skills often are" (Center on the Developing Child at Harvard University, 2014, p. 12). These demands include working memory, inhibition, cognitive flexibility (Karbach, 2015) as well as emotional control (Greenstone, 2011). "Working memory is taxed by many classroom activities such as following instructions, performing tasks that

require combining cognitive processing with storage, and seeing complex tasks through to completion" (Gathercole & Allowa, 2008 as cited by Holmes & Gathercole, 2014).

The ability to focus on a task, remember instructions or details of a lesson, and sustain attention are abilities associated with working memory that directly impact academic performance. Academic success is also determined by the EF skill often associated with maturity, that is, the ability to control one's impulses. The skill necessary to resist impulses and inhibit disrupting behaviour is not yet fully developed in early adolescence (Blakemore & Choudhury, 2006) yet it is an essential part of academic success in a traditional classroom. Listening to instructions before beginning an activity, walking in the hallway without tackling a friend, and refraining from blurting out test answers are all examples of the inhibitory control necessary to have a successful school experience.

Cognitive flexibility is described as "the ability to switch from one rule to another rule and the ability to maintain and select two (or more) rules" (Karbach, 2015, p. 65). In the school setting, this skill is demonstrated by "the ability to switch attention, deal with transitions, tolerate change, think flexibly [and] shift focus" (Greenstone, 2011, p. 102). It is also associated with the higher order thinking necessary to analyze context, evaluate opinions or understand worldviews –essential skills for social navigation as well as academic success.

The EF skill that directly impacts a student's academic success, social relationships and, most importantly, the ability to access the EF skills previously mentioned, is emotional regulation. Adolescence is characterized by the need to find one's place in a social hierarchy and develop meaningful relationships with peers and/or caring adults. In the presence of a myriad of environmental stressors, relationships are key to making stress tolerable and developing resilience and youth are naturally wired to find those connections.

The Social Brain

In his book, *The Social Neuroscience of Education*, Cozolino (2014) describes a classroom in which students and teachers work together to solve problems and find ways for each individual to make a positive and important contribution to the community. He calls this a "tribal classroom" and posits that "while western culture has changed a great deal during the last 5,000 years, the social instincts, physiology, and biochemistry of the neural networks that evolved for 100,000 years in the context of tribal life remain essentially unchanged" (p. xxiv).

The human brain seeks important feedback from the people around us. The faces we see tell us if our environment is safe and our bodies respond automatically. Face recognition, imitation and mirroring are part of the sensory, motor, and affective systems of the social brain (Cozolino, 2013). "While our motor networks practice what you see is done by others, our emotional networks resonate with what we see is being felt by others. This emotional resonance then becomes the core of empathy" (Cozolino, 2013, p. 147).

School is a stressful environment, particularly in adolescence, and accessing the social and emotional skills necessary to navigate the daily experiences of this microcosm is further complicated by the neurological stress response. "Increased task demands, heightened emotions, and peer pressure do little to accentuate the use of tracks involving the prefrontal cortex and instead promote high levels of activation in the amygdala in the subcortical region" (Dahl et al., 2017, p. 67). The fight, flight or freeze response of the limbic system, in effect, disengages the prefrontal cortex and inhibits the ability to access working memory, think rationally (cognitive flexibility), exercise inhibitory control or emotional regulation. Additionally, chronic stress can "have lasting effects on mental health because glucocorticoids rapidly access the brain to influence learning memory and emotional processing by binding to receptors in the prefrontal

cortex, amygdala, and hippocampus, three brain regions involved in learning, memory and emotional regulation" (Dahl et al., 2017, p. 57).

The same neural networks support social behaviour, emotional regulation, and the stress response system (Cozolino, 2013; Imordino-Yang, 2016; Porges, 2017), however, these neural networks can only function appropriately if suitable conditions of safety and security, emotional well-being and meaningful connections to other people are met (Scalise & Felde, 2017). While physical safety is not as large of a risk as it once was in primitive cultures, emotional security remains challenged by the daily expectations of the traditional school setting in which students are consistently compared to a normative center and are judged in terms of academic, behavioural, social, and emotional ability or, as is often the case, disability. This becomes even more significant during the self-conscious adolescent years, when sensitivity to social threat and dominance hierarchies is at its peak, and youth are especially alert to social risk appraisal (Blakemore, 2018).

The Impacts of Stress & Trauma

Schools are stressful environments. The pressure to meet daily expectations and goals, achieve academic success, and navigate the social complexities of the typical junior high school can be difficult for students and teachers alike. Alberta Health Services Trauma Informed Care: Information for Health Care Professionals (2022) defines trauma as "experiences that cause intense physical and psychological stress reactions to events and/or adverse environmental conditions" (module 1). Trauma is often thought of as an acute event that has occurred in the past and requires support to recover from (perhaps as a result of unresolved toxic stress). According to the Center on the Developing Child at Harvard University (2014), toxic stress "can occur when a child experiences strong, frequent, and/or prolonged adversity—such as physical or

emotional abuse, chronic neglect, caregiver substance abuse or mental illness, exposure to violence, and/or the accumulated burdens of family economic hardship—without adequate adult support". This definition implies an event that may be current, occurring in the present, which requires support to manage presently. As educators, we are uniquely situated for action in the form of buffering toxic stress with caring relationships and safe environments. Therefore, for the purposes of this project, I will use the term toxic stress, interchangeably with trauma, as this term implies that action can, and should, be taken to support adolescents.

Adverse childhood experiences (ACEs) such as neglect, abuse, and household dysfunction, can directly impact social, emotional, and cognitive development. "Pediatricians and others are expressing concern about the number of children that are being treated for ADD/ADHD who may actually have the childhood version of post-traumatic stress disorder" (Asda, 2014, 08:57). Physical symptoms of stress can include a weakened immune system, inflammatory response, and epigenetic changes to brain function which present as a profound lack of EF skills. These skills include working memory, focus and attention, inhibition control, lack of organization and inability to self-regulate emotions. As educators, it is essential that we be aware of the rising prevalence of students experiencing ACEs in our classroom. Students who come to school suffering from ACEs, such as a lack of adequate nutrition, disrupted sleep patterns, a lack of feeling of security due to dysfunctional family dynamics or even a feeling of shame or anxiety often exist within a constant state of stress.

A recent Alberta ACEs study of adult Alberta residents revealed that over 50% of our provincial population has experienced one or more ACEs. And 20% have three or more (McDonald et al., 2015). The Center on the Developing Child at Harvard University (2020)

posits that as the number of ACEs increases so does the risk for negative outcomes. Anda (2014) states:

> Students with three or more ACEs are two and a half times more likely to fail a grade. They score lower on standardized tests, have language difficulties, are suspended or expelled more, are designated as special education more frequently and, as you would expect, they get sick more. (01:02).

If we apply those statistics to a typical classroom, we see a significant impact. "In a representative classroom, there would be six students with no ACE, five with one, six with two, three with three, seven with four or five, and three with six or more." (Anda, 2014, 01:43). That is almost half the population of a classroom of students with three or more ACEs. Our educational system has been based on the myth of the normal child – one who has 0 ACEs, who comes to school with their basic needs met and is in the optimal zone of regulation for the cognitive and social challenges in the classroom. This data suggests that only a small portion of our typical classroom fits that description. Our classroom demographic has changed and so, it can be argued, must our perception of normal.

Rising stress levels also have a significant impact on physiological and psychological impact on teachers. Stress filled environments impede the creation of meaningful relationships, the development of professional or academic competence, and the nurturing of autonomy. Emotional exhaustion, a decreased sense of accomplishment, and depersonalization (Nagoski & Nagoski, 2019) impedes an educator's ability to fulfill their own psychological needs, let alone those of their students. In this environment, teachers often seek solace through familiarity and default to teaching the way they were taught or seek control by imposing classroom management strategies that may be detrimental to students who suffer from stress related health issues.

Our brains react in the same way to threats against the mind as it does to threats against the body. Because of this, "disrespect, shame, and humiliation shut down learning as quickly as physical attacks" (Cozolino, 2014, p. 244). This threat response, originating in our primitive brain stem, releases the neurotransmitters dopamine and glucocorticoids to mobilize us for the survival mechanism of fight or flight (Scalise & Felde, 2017), however, in the presence of chronic stress or trauma, and in situations where options for mobilization are minimized, a second adaptive response may be activated—immobilization, dissociation or depression (Porges, 2017).

The social engagement system "emerges from a heart-face connection that coordinates the heart with the muscles of the face and head" (Porges, 2017, p. 27). It describes the link between somatomotor pathways involved in looking, listening, and witnessing and the visceromotor pathways that regulate the heart and breathing in an autonomic response to our environment through the process of neuroception (Porges, 2017). This is significant because these are the same neural circuits that support social behaviour and emotional regulation through social attunement which "leads to an understanding that to connect and co-regulate with others is our biological imperative" (Porges, 2017, p. 51).

The Adolescent Mind, Identity, and Self-Determination

Whereas neuroscience explains the physical ever-evolving structures and neural pathways involved in brain function and development, psychology is the science of the mind and how thoughts, emotions, and cognitive processes are integrated to create personal identity. Adolescence is an essential stage of development in which the social brain integrates with the subcortical and cortical regions of the brain and the pathways connecting the right and left hemispheres strengthen, in order to create the person you are (Blakemore, 2018; Cozolino, 2013; Siegel, 2008). Differentiating between the brain, with its structures and functions, and the mind

with its thoughts and cognition, is important as it elucidates the interconnected, causal, relationship between brain, mind, and behaviour.

In his book, *Mind: A Journey to the Heart of Being Human*, Dan Siegel explores the brain-mind connection and labours to create a working definition of the mind. He eventually lands on this: "the mind is an emergent, self-organizing, embodied, and relational process that regulates the flow of energy and information" (2012). For junior high school students, I differentiate between the brain and the mind in simpler terms: the brain is the physical organ (the meat) whereas the mind is the process (the soul) which, together with the body, creates you. The mind is our ongoing and ever-changing experiences, thoughts, opinions, and beliefs that make up our personal identity.

Blakemore and Mills (2014) posit that the medial prefrontal cortex is the area in the brain most active in what they call mentalizing, the ability to "to figure out what other people are thinking and feeling, and what they are about to do next" (p. 111). This is a key process in adolescent development of empathy and self-identity. We begin to develop an idea of who we are through our social self, and the way others see us (initially our parents and siblings, then teachers and peers) in conjunction with our self-appraisals based on experiences (Blakemore, 2018). This could explain why adolescents seem more introspective, why fitting in with certain social groups is so important and why personal agency becomes more relevant.

School is a social environment, and the adolescent brain is uniquely sensitive to experiences, both positive and negative, that construct the biological infrastructure for the creation of self-identity (Blakemore, 2018). Positive experiences can support healthy risk taking, such as goal setting and rising to meet academic or athletic challenges, resulting in increased learning opportunities and improved self-confidence, whereas negative experiences can lead to

unhealthy choices, increased problematic patterns of behaviour and ultimately lead to internalized core shame (Dahl et al., 2017; Cozolino, 2013). Educational experiences have a lasting impact on who we become (Blakemore, 2018; Cozolino, 2013), thus, it is essential that our pedagogy supports a positive developmental trajectory through purposeful planning and mindful practices that are informed by science.

PART 2: The Pedagogy

Education is, for the most part, a profession in which teachers are given autonomy to decide the methods and practices they use in their classrooms. While curriculum dictates the essential knowledge, skills, and attitudes important for students to learn, teachers decide where to direct their focus and how to deliver curriculum to their classes. I suggest that pedagogy aligned with, and supportive of, adolescent development focus more on the skills and attitudes found in the curriculum documents, rather than the content. These are the elements of learning that help build the internal capabilities mentioned previously (critical and creative thinking, ethical decision making, and empathy) and support the development of personal enablers (Brown et al., 2017) by providing educational opportunities that prepare students for their impending role as adults in society.

This project provides teachers with the pedagogical reasoning for implementing a social curriculum that creates an educational environment supportive of the contextual enablers of thriving. By focusing attention and energy on building an environment based on safety, respect, responsibility, and relationships, teachers provide adolescents with the necessary conditions to develop their own internal capacities for wellness.

Research supporting collaboration with adolescent students about their own educational needs, learning preferences, and personal goals, has shown an increase in student engagement

and motivation (Yeager, Dahl & Dweck, 2017). Connecting with their own learning, building trusting relationships with teachers and peers, and establishing relevance through connections to the larger community and local culture reduces stress and enhances adolescent thriving, thus creating the conditions necessary for true and enduring learning.

Conditions for Learning

Educators understand that sound pedagogical practices include the establishment of safe and caring classroom communities that mitigate the negative impacts of stress, promote respectful social environments, and provide opportunities for self-determination through the satisfaction of the basic psychological needs of autonomy, relatedness, and competency. Quality learning environments must provide clear and consistent expectations, including high standards and personal accountability, and support the development of psychological resilience, by providing safe opportunities for risk taking and learning from mistakes, so that students can develop social and academic competencies (Cozolino, 2013; Greene, 2014; Hewson, 2015).

Community building requires a reciprocal relationship in which teachers and students support, and are in turn supported by, a larger learning community, based on respect and responsibility (Zhou & Brown, 2017). Elder George Brertton stresses the need to empower students by saying, “We have to be able to learn to give them back responsibility for their own actions” (Bearpaw, 2018, 18:06) and in doing so, provide guidance, support, and expect accountability when mistakes are made. Teachers in this environment are uniquely situated to model respectful and responsible behaviour, and, I propose, are duty-bound to do just that.

Wahkohtowin

The acts of collaboration and reciprocity between teacher and student, although new to our institutionally designed school system, is an ancient and natural way of learning.

Wahkohtowin is the Cree word for the rules that govern the relationship of one thing to another. It is the guideline that ensures all people respect one another living on this earth (Bearpaw, 2018). The Cree worldview includes three parts: the act of being related as people; the existence of an animate and full spirit connected to all things; and a code of conduct in which we are obligated to uphold and maintain a positive relationship with all of existence (Wildcat, 2018).

Wahkohtowin includes the understanding of living together in harmony is to have mutual respect, obligation, and responsibility to foster and maintain healthy relationships (Bearpaw, 2018). It is a moral and social contract with the community and the environment in which one lives, works, and learns. In the context of a classroom, Wahkohtowin includes teachers and students as equal shareholders in the learning environment, with responsibility for the learning, behaviour, and the well-being of one another and for themselves. "The Wahkohtowin class embraces a commitment to healthy relationship as justice in action and aims to enact the restoration of right relations through pedagogy" (MacDougall, 2010, p. 15).

The Wahkohtowin classroom provides an environment for learning by "encompassing the act of being related, a worldview that everything is related, and a set of laws or obligations around how to conduct good relationships" (Wildcat, 2018, p. 15). It taps into the principles of social cognitive theory, the social neuroscience of learning, and social justice, through the teaching and learning of pro-social behaviours in the context of relationships, while also situating learning within an understanding of what it means to be a part of a larger community.

Place and Play-Based Pedagogy

Place and play-based learning are two distinct pedagogical perspectives; however, they are similar in two aspects. First, they are traditional, historical, and even primal, forms of growth and development natural to humankind. Second, both pedagogies have been noticeably absent in

the cultural perception of modern education. Learning has existed for as long as we have walked the earth, long before the invention of schools, and it is erroneous to create a dichotomy between the two pedagogies. Place and play-based pedagogies bridge the gap between the development of the biological structures for learning, the psychological needs for self-determination and the manufactured environment of the typical classroom, as a result, creating a natural context for learning that reduces stressors and increases valence.

Place-based pedagogy situates learning within students' social and environmental realities, however, in order to do so, one must be conscious of place. I have noticed, in my experience as a student and as a teacher, in small rural communities, that there can be a distinct degree of separation between community and school. As a student, my family made me aware that teachers were outsiders and didn't understand us (which was very often true), and as a teacher, I was aware of the discomfort many parents had on the rare occasions they entered the building (often due to their own past negative experiences). The tension between teachers and parents, school, and community, created a contradiction that students were expected to navigate —a state of cognitive dissonance— that was understandably stressful and generally culminated in decreased parental involvement and increased student detachment, by junior high school. Place-based, or place-conscious, pedagogy "diminishes the boundaries that exist between schools and their social and environmental settings" (Kelly & Pelech, 2020). Thus, creating a Wahkohtowin context for learning that respects and includes all educational shareholders despite cultural differences, and reduces respect threats created by tensions between them.

Play-based pedagogy reduces educational stressors and increases the development of EF through the inherent existence of fun, humour, laughter, and reward within play. Cozolino (2013) states:

> It turns out that while the amygdala triggers learning in both humorous and stressful situations, humor enhances emotional regulation and new cortical learning. Laughter also stimulates social-emotional connections from one person's right hemisphere to another person's right hemisphere. Because understanding and appreciating humor rely on abstract and semantic networks on both sides of the brain, humor also supports lateral connectivity and integration. (p. 89)

While there is little doubt that play is essential for "children's progress and growth across the physical, language, social, emotional, and cognitive development domains" (Pyle et al., 2020, p. 55), it is often misunderstood as lacking educational relevance, thus not prevalent in many classrooms, especially those in higher grades. Pyle et al. (2020) attribute this to an educational and cultural misinterpretation of play as free-play or free time. However, that is only one end of a continuum of play-based pedagogy. The other end of the continuum requires teacher involvement to guide and scaffold activities with specific learning objectives in mind.

In a junior high classroom, it is possible to create the conditions for place and play-based pedagogy. Recently, I provided a grade nine volunteerism class the opportunity for free-play. This was not free time as it was structured by two caveats: first, no phones were allowed; and second, students were only allowed to choose from a variety of board games, building toys, puzzles or, have face to face conversations. Learning objectives were purposefully aligned with our plans to volunteer with younger students in the local elementary school and links were explicitly made to earlier learning about the development of EF skills. Classroom observations revealed a noted reduction in task avoidance and an increase in social engagement, problem solving, creativity and laughter. By connecting curricular outcomes, play, and a role within the

larger community, these adolescent students were deeply engaged in a learning activity that supported their own growth and development of EF skills.

Aligning pedagogy with practice is a challenge educators must regularly face. Creating external conditions that provide positive educational experiences and honour individual needs while delivering mandated curricular content requires teachers to strike a balance between curriculum and lived and curriculum as planned (Aoki, 2005). I believe that teachers need to have a solid, foundational knowledge of their students, and their curriculum; they must have the skills to navigate often uncharted territory, make judgment calls, and trust their intuition; and, above all, teachers must have resilience in order to maintain the positive attitude necessary for success. Teachers have a monumental challenge, however, with organizational support, and practical resources, such as, but certainly not limited to, the resources provided in this project, it is not impossible.

PART 3: The Practice

The fundamental purpose of teachers, regardless of their educational philosophy, is to teach, it is therefore imperative that teachers understand their learners. Providing teachers with practical, effective strategies to harness adolescent neurobiology and improve engagement, motivation, and learning is the rationale for this project. A commitment to understanding how the adolescent brain learns, and the social-psychological impacts on cognition, is necessary to inform instruction, improve academic achievement, and refine the social efficacy of adolescent learners.

Implementing lessons and strategies that promote positive emotions and attitudes towards learning is the first step in engaging and motivating adolescent learners (Ponnet, 2019; Scalise & Felde, 2017). Lessons dedicated to explicitly teaching the neuroscience of learning, growth mindset, and respect for diversity can establish a foundation for student motivation and empower

students with self-knowledge, a precursor to metacognition; agency, through personal choices that impact of their own destiny; and relatedness, through connecting with others (Blakemore, 2008; Katz, 2018; Ryan & Deci, 2019; Yeager et al., 2017). Grounding learning in play-based pedagogy can reduce stress and create safe conditions for engagement and persistence as well as social and cognitive development (Pyle et al., 2020); and using place-based pedagogy (Kelly & Pelech, 2019) promotes authentic learning through connection to community and self.

Many experienced teachers know that, without a strong foundation in classroom management strategies, implementation loses efficacy, and what was planned can become mutated by daily drama and realities of the classroom. Community building and restorative practices are essential for a thriving class dynamics. Understanding adolescent neurobiological and the need for contingent free, supportive relationships, in conjunction with respect for autonomy and high expectations for accountability is crucial. I suggest that there are two essential components to a functional and healthy junior high classroom: a foundation in Wahkohtowin to create the conditions for learning well together; and collaborative and proactive solutions to deal with the challenging behaviours that are an unavoidable part of being human. These two strategies incorporate respect for adolescent brain development by creating a context for learning based on genuine respect, supportive relationships, accountability, and self-determination.

Community Building

Practical applications of Wahkohtowin in the classroom begin with the teacher and their educational axiology. To establish a classroom culture based on respect and responsibility one must value relationships over content, and students over curriculum. This can, at times, be challenging in an industrial based educational system focused on standardized testing, academic

norms, and specific skills acquisition, however, it does not have to be. Beginning the school year by getting to know your students, establishing classroom routines and procedures, and discussing expectations is sound pedagogy. Wahkohtowin can be embedded into this practice by explicitly teaching the concepts of the circle of courage, inclusivity, social-emotional learning, and restorative practices.

Much of what effective teachers already do is aligned with the fundamental values of Wahkohtowin. Sharing circles, classroom celebrations, collaborative learning, and project-based activities are all student-based, social learning experiences that support whole child education and foster the development of self-esteem. Explicit teaching of the Circle of Courage (Brendtro et al., 1990) can serve as a starting point from which to begin to teach students that they are more than just their grade and education is more than just the three R's. Brendtro et al. (1990) explains:

> Traditional native educational practices addressed each of these four bases of self-worth: (1) significance was nurtured in a cultural milieu that celebrated the universal need for belonging (2) confidence was ensured by guaranteed opportunities for mastery (3) power was fostered by encouraging the expression of independence and (4) virtue was reflected in the preeminent value of generosity. (p. 45)

Classroom activities, particularly at the beginning of the year, defining and connecting with each element of the Circle of Courage is a powerful lesson in self-awareness and esteem building for individual students, and lays a solid foundation for classroom community expectations such as belonging and generosity.

In her book, Ensouling our Schools: A universally designed framework for mental health, well-being and reconciliation, Jennifer Katz (2018) describes the four components of the Circle

of Courage as: belonging, mastery, independence, and community. She compares this to the medicine wheel and makes the connection to the spiritual, physical, emotional, and mental aspects of being. Katz describes classrooms as “ensouled learning communities” (p. 11) and posits that students, teachers and all school staff require value, meaning and opportunity to be engaged. Katz provides a “Three Block Model of Universal Design for Learning: the basic theories and values of inclusive education, SEL, and health promoting schools” (p. 6) as a framework for creating inclusive schools. She also provides practical lesson plans, rubrics, and exemplars for teachers to use in their own classrooms.

All schools, even inclusive, safe, and caring ones, require a plan for when mistakes are made. It is how this feedback is given that sets a Wahkohtowin classroom apart. Hopkins (2011) provides specific strategies to create a restorative classroom and how to respond to behavioural challenges in The Restorative Classroom: Using Restorative approaches to Foster Effective Learning. Hopkins posits that “Restorative approaches are all about making, maintaining and, when things go wrong, repairing relationships” (p. 5). In the restorative classroom a mistake is considered a learning opportunity and since power, control and responsibility are shared by everyone, a mistake is recognized “when a person, a youngster or an adult, act in ways that they themselves have agreed are inappropriate in relation to their own and other’s needs” (p. 162). By approaching behavioural mistakes as communication of unmet needs (Greene, 2014; Hopkins, 2011) rather than a purposeful act, the restorative classroom teacher can facilitate learning from one’s mistakes in a respectful and beneficial way.

Hopkins details a sequence of restorative responses when things have gone wrong. First, restorative enquiry—very similar to the process of collaborative problem solving designed by Greene (2014). Second, thinking sheets or storyboards —for when emotions are too hot for

conversation. Third, reframing the problem —the empathy step (Greene, 2014; Hopkins, 2011). Fourth, conversations between affected parties —both parties enter the conversation as equals to talk it out and the adult is simply a listener. Fifth, conferencing —a conversation in which a neutral third-party acts as a mediator, and finally, classroom restorative circles — when a problem affects everyone there are scripted steps to follow in order to repair community relationships.

Good teachers know that students learn better in a nurturing environment. A classroom that values the principles of respect for self and others, individual and collective responsibility, and authentic relationships is one where learning occurs. It is a classroom where students and teachers feel welcome, cared for, and encouraged to make both academic and behavioural mistakes for they are reframed as learning opportunities. It is a Wahkohtowin Classroom.

Challenging Behaviour

Teaching and learning is a reciprocal relationship that requires trust, respect, and personal investment, yet, it can be argued, that the traditional school system —based on a power differential of the teacher directed education—continues to follow in the footsteps of early behaviorist approaches of the twentieth century. In a traditional system teachers assume that behavior is learned, therefore, it must also hold that behaviors can be unlearned and replaced by acceptable ones through operant conditioning (Zhou & Brown, 2017).

This system of rewarding the acceptable and punishing the unacceptable behavior may elicit observable results in a portion of our diverse student population, particularly as the adolescent brain is wired for reward (Scalise & Felde, 2017), however, behaviorism oversimplifies the complexity of human behavior and fails to consider internal psychological and physiological processes of self-determination (Ryan & Deci, 2017; Zhou & Brown, 2017). A

punitive system has been proven ineffective in dealing with student behaviour, does little to support complex student needs and creates an atmosphere incongruent with student learning. (Greene, 2014).

A collaborative approach to teaching and learning, such as Bandura's Social Cognitive Theory, suggests that "learning occurs in a social context with the dynamic and reciprocal interaction of the person, environment, and behavior" (Zhou & Brown, 2017, p. 19). Structures of collaboration embedded into a classroom, and school, supports the development of relationships in a nurturing environment, and sets the stage for increased engagement, attention, and motivation for learning (Hewson, 2015). This cooperative model gives individual agency to the student—empowering them with the ability to influence their environment—and collective agency to the classroom community as they work together to achieve common benefits (Zhou & Brown, 2017).

Collaborative and Proactive Solutions

Greene (2014) posits that the single most important step teachers can take in supporting students with challenging behaviour is to change their mindset from one of judgment to that of curiosity. Green credits lagging EF skills (flexibility, adaptability, frustration tolerance, and problem solving) as being the primary contributor to behavioral challenges and postulates that these behaviors occur in conditions in which the expectations being placed on the child outstrip their skills (Greene, 2014). Therefore, rather than attempting to manage student behaviour, he suggests working collaboratively with students to identify unsolved problems and support the underlying cognitive skill deficits at the root of the issue. He calls this process Collaborative & Proactive Solutions (CPS).

CPS refers to a student's maladaptive behaviour as "incompatibility episodes" and suggests that maladaptive behaviour is an indication that environmental expectations are too challenging for the student's ability to behave adaptively. He proposes a framework that supports the satisfaction of basic psychological needs for autonomy and relatedness, while facilitating the development of social emotional competence (Green & Winkler, 2019). Teachers engage empathetically with the challenging student in a supportive, conversational atmosphere. They prompt the student to explain the reasons for their difficulty without naming the specific behaviour because, the behaviour is not the issue, it is merely the means of communicating difficulty. The teacher seeks understanding of the perspective of the student before expressing their concerns (still, without naming the behaviour). Finally, the teacher invites the student to suggest solutions to the problem and collaboratively, teacher and student, create a proactive plan to mitigate future incidents. This process allows students a voice and a choice, provides insight about what skills the student may need support in developing (academic, social, emotional, cognitive) and, most importantly, establishes a relationship in which both teacher and student mutually agree to a plan of action.

For relationships to promote well-being, they must be volitional, supportive of autonomy, and non-contingent (Ryan & Deci, 2017). Traditional models of behavioural intervention such as Positive Behaviour Supports (PBS), or Applied Behaviour Analysis (ABA), focus on the behaviour rather than their underlying causes and aim to motivate students to make "good" choices by using rewards and punishments, thus creating a relationship of conditional regard (Ryan & Deci, 2017), in which the student must earn a reward (e.g., praise or a desired activity) or avoid a punishment (e.g., disapproval or detention). Conditional regard externalizes the perceived locus of causality which undermines the student's autonomy for connecting, thus

detracting from a sense of relatedness (Ryan & Deci, 2017), In contrast, the CPS model of supporting students who exhibit *incompatibility episodes* gives teachers the tools needed to support student autonomy and build meaningful, mutual relationships (Greene, 2014).

Fostering an environment with priorities centered on school connectedness and relatedness is linked to positive outcomes for both students and teachers. Duke (2020) suggests that "some relationships between ACEs and adverse student education outcomes are attenuated by school connection (p. 624) and posits links to lower absenteeism, increased completion rates and increased educational motivation and engagement. The CPS model of cognitive behavioural therapy facilitates relationship building with empathy at its core. It enables teachers to provide traumatized students with autonomy support which promotes need satisfaction along with authenticity, emotional resilience, transparency, and non-defensiveness (Greene & Winkler, 2019; Ryan & Deci, 2017).

Autonomy support also comes with an added value for teachers. Ryan & Deci (2017) proposed that it was the "giving of autonomy support rather than receiving it that had a stronger relation to the person's well-being" (p. 311). Allowing students to own their own experiences can be one of the most difficult steps for educators who have been immersed in an educational system in which the goal has been compliance, however, it is a necessary step in supporting independence. Experience has taught me that, in relinquishing my authoritarian hold and the misconception that I was the one who had to solve the problems, my students have demonstrated insights and abilities I would never have otherwise known. The positive, genuine relationships that have evolved from this one change has led to significant improvement to my own well-being in junior high school.

Conclusion

Teachers are busy, classrooms are complex, and stress is the reality of the modern classroom, particularly since returning to school after a pandemic, in which all learners have experienced social isolation and emotional stress. It is important to understand that teachers are often in survival mode and, while they may be seeking the information and strategies to alleviate their workload, they are also in a state of cognitive overload that creates resistance to new ways of teaching and learning (Scalise & Felde, 2017). The purpose of this project is to provide teachers with not only knowledge, but effective and practical tools to improve adolescent teaching and learning; therefore, it is essential that the information provided be succinct, easy to access and understand, and useful without being diluted. As comedian Siebold (2021) says in his video, *Why Teachers Despise Professional Development*, "If you're not going to bring in a PD presenter who is going to give them something tangible, and full of substance, that they can use in the class right now, then you are just hurting them". My hope is that access to this digital resource will increase student and teacher capacity to thrive within the limits of our current educational system.

The goal of education is student learning and well-being; however, this cannot be accomplished without teacher learning and well-being. Much like the brain-mind connection in the creation of identity, students and teachers have a mutualistic relationship, serving as parts of an educational whole. Empowered with knowledge about the biological underpinnings of adolescent behaviour, and developing an understanding of why kids do what they do, increases teacher empathy, and reduces their own stress response, thus, increasing their capacity to co-regulate, and continue to learn and grow, with their students. The teacher sets the tone of the

classroom, and when that tone is one of understanding, compassion, and respect for wellness, everyone benefits.

The creation of the website-based repository of resources, *So You Teach Junior High? Adolescent Neurodevelopment: Essential Knowledge and Practical Resources for Teachers*, was motivated by my experience in the public school system. It is intended to provide teachers the tools they need, but more importantly, empower them with essential knowledge to understand adolescent learners and potentially redress misconceptions and reframe attitudes about this sensitive stage of human development. Teachers in junior high school are uniquely situated to create thriving learning communities for all and, I suggest, it is our duty to do so, particularly in this time-sensitive, challenging, and intricate dance of education, growth, and, ultimately, becoming who we are.

References

Aoki, T. (2005). Teaching as an indwelling between two curriculum worlds (1986/1991), in Pinar, W.F. & Irwin, R.L. (Eds). *Curriculum in a new key: The collected works of Ted Aoki*. Lawrence Erlbaum Associates, 159-163.

Alberta Health Services. (2022). *Trauma informed care: Information for health care professionals*. https://www.albertahealthservices.ca/info/page15526.aspx

Anda, R. (2014). *The ACE study: Building self-healing communities*. [Transcript] https://www.albertafamilywellness.org/resources/video/the-ace-study-building-self-healing communities

Bearpaw media and education. (2018, June 8). Wahkohtowin: Cree natural law [Video]. YouTube. https://www.youtube.com/watch?v=NTXMrn2BZB0

Blakemore, S.-J. (2012). Development of the social brain in adolescence. *Journal of the Royal Society of Medicine*, *105*(3), 111-116. https://doi.org/10.1258/jrsm.2011.110221

Blakemore, S.-J. (2008). The Social Brain in adolescence. *Nature Reviews Neuroscience*, *9*(4), 267-277. https://doi.org/10.1038/nrn2353

Blakemore, S., & Choudhury, S. (2006). *Development of the adolescent brain: Implications for executive function and social cognition*. Retrieved July 18, 2020, from https://www.ncbi.nlm.nih.gov/pubmed/16492261

Blakemore, S.-J., & Mills, K. L. (2014). Is adolescence a sensitive period for sociocultural processing? *Annual Review of Psychology*, *65*(1), 187–207. https://doi.org/10.1146/annurev-psych-010213-115202

Brendtro, L. K., Brokenleg, M. & Van Bockern, S. (1990). *Reclaiming youth at risk: Our hope for the future.* Solution Tree Press.

Brown, D. J., Arnold, R., Fletcher, D., & Standage, M. (2017). Human thriving. *European Psychologist*, *22*(3), 167-179. https://doi.org/10.1027/1016-9040/a000294

Canadian Teachers' Federation. (2022, April 24). But at what cost? Teacher mental health during covid-19: Pandemic research report. https://vox.ctf-fce.ca/mental-health-researchreport/

Center on the Developing Child at Harvard University (2014). Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence. Retrieved from www.developingchild.harvard.edu

Dahl, R., Suhleiman, A., Ward, E., Luna, B., & Choudhury, S. (2017). The adolescent brain: A second window of opportunity: A compendium. https://www.unicef-irc.org/publications/pdf/adolescent_brain_a_second_window_of_opportunity_a_compendium.pdf.

Dekker, S., Lee, N. C., Howard-Jones, P., & Jolles, J. (2012). Neuromyths in education: Prevalence and predictors of misconceptions among teachers. *Frontiers in Psychology*, *3*. https://doi.org/10.3389/fpsyg.2012.00429

Cozolino, L. (2013). *The social neuroscience of education: Optimizing attachment & learning in the classroom.* W. W. Norton & Company.

Cozolino, L. (2014). *The Neuroscience of human relationships: Attachment and the developing social brain.* W. W. Norton & Company.

Craig, S. E., (2017). *Trauma sensitive schools for the adolescent years: Promoting resiliency and healing, grades 6-12*. Teachers College Press.

Faculty of Education. (n.d.). *Neuroscience research in the classroom*. University of Lethbridge. https://www.ulethbridge.ca/education/story/4105

Gibb, R., & Kolb, B. (2018). *The neurobiology of brain and behavioral development*. Academic Press.

Greene, R. W. (2014). *Lost at school: Why our kids with behavioral challenges are falling through the cracks and how we can help them*. Scribner.

Greenstone, H. (2011). Executive function in the classroom: Neurological implications of classroom intervention. *LEARNing Landscapes*, *5*(1), 101-114. https://doi.org/10.36510/learnland.v5i1.534

Gruenwald, D. A. (2008). The best of both worlds: A critical pedagogy of place. *Environmental Education Research 14*(3), 308-324.

Hopkins, B. (2011). *The restorative classroom*. Optimus Press.

Immordino-Yang, M.H. (2016). *Emotions, learning, and the brain: Exploring the educational implications of affective neuroscience*. W. W. Norton & Company.

Karbach, J. (2015). Plasticity of executive functions in childhood and adolescence: Effects of cognitive training interventions. *Revista Argentina de Ciencias del Comportamiento*, *7*(1), 64-70.

Kelly, D., & Pelech, S. (2020). Canadian contexts for exploring transformative student agency through place conscious pedagogy. *Education in the North*, *27*(1), 110-124.

Kolb, B., Whishaw, I. Q., & Teskey, G. C. (2019). *An introduction to brain and behavior*. Macmillan International.

McDonald, S., Kingston, D., Bayrampour, H., & Tough Mail, S. (2015). Adverse childhood experiences in Alberta, Canada: A population-based study. *Medical Research Archives*, (3), 1-18.

Torrijos-Muelas, M., González-Víllora, S., & Bodoque-Osma, A. R. (2021). The persistence of Neuromyths in the educational settings: A systematic review. *Frontiers in Psychology, 11*. https://doi.org/10.3389/fpsyg.2020.591923

Phillips, D. (Eds.). (2012). *Interventions in executive functioning*. Palix Foundation. https://www.albertafamilywellness.org/resources/video/interventions-in-executive-functioning

Katz, J. (2021, March 23). *The three-block model of UDL*. Home of the three block model of UDL and the RD program. http://www.threeblockmodel.com/the-three-block-model-of-udl.html

Katz, J., & Lamoueux, K. (2018). *Ensouling our schools: A universally designed framework for mental health, well-being, and reconciliation*. Portage & Main Press.

Kelly, D. & Pelech, S. (2019). A critical conceptualization of place-conscious pedagogy. *European Journal of Curriculum Studies 5*(1), 732-741.

Nagoski, E. & Nagoski, A. (2019). *Burnout: The secret to unlocking the stress cycle*. Ballantine Books.

Nussbaum, M. C. (2006). Education and democratic citizenship: Capabilities and quality education. *Journal of Human Development*, *7*(3), 385-395. https://www.tandfonline.com/doi/abs/10.1080/14649880600815974

Nussbaum, M. C. (2011). *Creating capabilities: the human development approach*. Belknap Press of Harvard University Press.

Peace River School Division. (n.d.). *EE oliver elementary school.* https://www.eeoliverelementary.ca/about

Peace River School Division. (n.d.). *Fairview jr./sr. high school*. https://www.fairviewhigh.ca/about

Ponnett, V. (2019, November 11). *Using insights of neuroscience to improve teaching and learning* [Video]. TED. https://www.ted.com/talks/veerle_ponnet_educational_evolution_using_insights_of_neuroscience_to_improve_teaching_and_learning?utm_campaign=tedspread&utm_medium=referral&utm_source=tedcomshare

Porges, S. W. (2017). *The pocket guide to the polyvagal theory: The transformative power of feeling safe.* W. W. Norton & Company.

Pressley, T. (2021). Factors contributing to teacher burnout during COVID-19. *Educational Researcher, 55*(5), 325-327. https://doiorg.login.ezproxy.library.ualberta.ca/10.3102/0013189X211004138

Pyle, A., Pyle, M.A., Prioletta, J. & Alaca, B. (2020). Portrayals of play-based learning: misalignments among public discourse, classroom realities and research. *American Journal of Play*, *13*(1), 53-86.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78.

Scalise, K., & Felde, M. (2017). *Why neuroscience matters in the classroom: Principles of brain-based instructional design for teachers*. Pearson Education.

Siebold, D. (2021, February 19). *How teachers really feel about PD presentations* [Video]. YouTube. https://www.youtube.com/watch?v=DKWC_oBFgQE

Siegel, D. J. (2008). *The neurobiology of we: How relationships, the mind, and the brain interact to shape who we are* [Audiobook]. Sounds True.

Wildcat, M. (2018). Wahkohtowin in action. *Constitutional Forum Constitutionnel*, *27*(1), 13-24. https://doi.org/10.21991/cf29370

Yeager, D. S., Dahl, R. E., & Dweck, C. S. (2017). Why interventions to influence adolescent behavior often fail but could succeed. *Perspectives on Psychological Science*, *13*(1), 101-122. https://doi.org/10.1177/1745691617722620

Appendix:

Recommended Resources and Descriptions

Resource	Description
AFWI- Building Better Brains *Science*	Created as a bridge between scientific knowledge of brain development and mental health and what is being done in policy and practice, The Alberta Family Wellness Initiative aims to improve the health and well-being outcomes of children and families across Alberta. In addition to the Brain Story Certification course, the AFWI provides resources for teaching and learning about brain development, Serve & Return, EF, trauma, and resiliency. This is essential knowledge, distilled in easy to access and understand chunks for educators, students, and families. While it does not specifically address adolescent brain development (yet) it is essential foundational knowledge necessary for understanding why and how many adolescents deficits in EF and social communication skills have compared to their peers.
Brainstory https://www.albertafamilywellness.org/training/ *Science*	While not specifically targeted to adolescent brain development, it would be remiss to not include this resource. "It puts scientific concepts surrounding developmental neurobiology, health, and wellness into a social context and shows how these topics connect and interact" by distilling the science of neurodevelopment into an easily understood narrative for non-scientists to understand and act upon. I believe this to be essential foundational learning for all educators.
Building Brains Together https://www.buildingbrains.ca *Science & Pedagogy / Practical Strategies*	Founded on research, Building Brains Together (BBT) was created by a committee of schools, early-learning groups, and the University of Lethbridge neuroscience department for the purpose of improving children's executive function skills through a science-based curriculum of activities. Inspired by the success of BBT in early childhood initiatives, they have since expanded to include an adolescent curriculum (currently being tested) and are developing an education series for teachers and parents.

Resource	Description
Bearpaw media and education. (2018, June 8). Wahkohtowin: Cree natural law [video]. YouTube. https://www.youtube.com/watch?v=NTXMrn2BZB0 Infographic *Pedagogy & Practical Strategies*	Before there was SDT, there was Wahkohtowin. There is little written about Wahkohtowin (presumably owing to the oral history traditions of the First Nations People) but this video describes what it is and why it is important for thriving communities. It serves as a launching point for class discussion regarding the importance of respect, obligation, and kinship in thriving communities and aligns seamlessly with the SDT. Relatedness applies to all things in the universe, and we have a responsibility, as creatures of this earth, to take care of the living and nonliving entities around us (competence) through our choices (autonomy). An accompanying infographic serves as an anchor chart for the expectations in the classroom.
Brendtro, L.K., Brokenleg, M. & Van Bockern, S., (1990). Reclaiming youth at risk: Our hope for the future. Solution Tree Press. *Theory & Practical Strategies*	Before there was SDT, there was the Circle of Courage. Based on traditional child rearing philosophy of whole child education and the development of self-worth (positive self-identity), the 4 facets of the circle of courage include Belonging, Mastery, Independence, and Generosity. These align with the three foundations of SDT. Belonging - Relatedness; Mastery - Competence; Independence - Autonomy. The fourth facet of the circle of courage, generosity, represents the feeling of worthiness and spiritual fulfillment and can be interpreted as a virtue resulting from the integration of belonging, mastery and autonomy. This aligns with SDT in that social development and wellness emerge from the satisfaction of the basic psychological needs of relatedness, competence, and autonomy.
Center on the Developing Child at Harvard University (2014). Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence. Retrieved from www.developingchild.harvard.edu. *Science & Pedagogy*	The Center on the Developing Child is a research and development platform focused on researching, testing, implementing and refining strategies to improve outcomes for children facing adversity. They believe science, combined with a community of like-minded innovators, can be used to achieve a promising future for every child, regardless of socio-economic status.

Resource	Description
Cozolino, L. (2013). The social neuroscience of education: Optimizing attachment & learning in the classroom. W. W. Norton & Company. *Science & Pedagogy*	The brain is a social organ. Cozolino connects neuroscience, cognition, and pedagogy by focusing on the human need for relationships. He introduces the concept of the "tribal brain" and stresses the importance of bonding, attachment, and emotional attunement for brain development and learning (isn't that the same thing?). He addresses the realities of the classroom that can impede learning: stress, social conflict (bullying, insecure attachment). He provides a neurological basis for play and place-based pedagogy and suggests the creation of the "tribal classroom" in which community is the foundation for learning. In doing so, he suggests strategies that support SDT (thus the Circle of Courage) without directly referring to either.
Craig, S.E., (2017). Trauma sensitive schools for the adolescent years: Promoting resiliency and healing, grades 6-12. Teachers College Press. *Science & Pedagogy*	Susan Craig effectively distills the neurobiology of trauma and toxic stress and its effects on learning and engagement, specifically in the adolescent brain. She correlates adverse childhood experiences with academic achievement and challenges educators to reframe their view of the academic and social difficulties demonstrated by many adolescents struggling in the current school system. Craig suggests that secondary schools may be ideally situated to mitigate the long-term developmental effects of trauma due to the unique stage of adolescent brain plasticity (second window of opportunity) and give youth an opportunity to develop academic and social skills that will equip them for success in adulthood. Craig challenges educators to step beyond good intentions, towards a commitment to improving academic and social mastery by "integrating knowledge of the effects of trauma on adolescent development into efforts at educational reform" (p.2) and provides administrators and teachers specific strategies on how to do this at the school and classroom levels. The goal of this resource is to equip educators with the knowledge, the strategies, and the will to create thriving learning environments that authentically meet the needs of students and teachers through the development of a positive school culture.

Resource	Description
Ethical Decision-Making video Infographic *Pedagogy & Practical Strategies*	In teaching students I have discovered that, in order to give them autonomy through decision making, understanding how and why we make the decisions we do is essential prior learning. I created the infographic to distill the teaching in the video, and use it as an anchor chart throughout the year.
Faith, L., Bush, C.A., & Dawson, P., (2022), Executive function skills in the classroom: overcoming barriers, building strategies. The Guilford Press. *Science & Pedagogy / Practical Strategies*	This book is a comprehensive, research-based, resource that defines Executive Function (EF) skills within the context of teaching and learning and provides strategies to develop EF literacy. Faith, Bush & Dawson suggests that one of the most important ideas in this book is the Barriers and Strategies Protocol (BSP). The BSP calls for a metacognitive approach of "mental contrasting with implementation intentions". This resource is unique in that the BSP is used both as a self-reflection tool for teachers to address thinking and teaching errors, as well as a strategy to support students develop independence and problem-solving skills. Much like Ross Greene's CPS model, the BSP is a dialogue between student and teacher, in which possible solutions to unsolved problems can be explored. Faith, Bush & Dawson provide specific examples of universal EF lessons incorporating mindset, motivation, and feedback that support the development of relationships, autonomy, and EF competence.
Greene, R. W. (2014). Lost at school: Why our kids with behavioral challenges are falling through the cracks and how we can help them. Scribner. *Science & Pedagogy / Practical Strategies*	Ross Greene is the father of the Collaborative and Proactive Solutions (CPS) model for dealing with kids exhibiting concerning behaviour. This trauma sensitive approach changes course from traditional, reward/punishment models of discipline which assumes students have the necessary skills, but lack the will, to behave appropriately to one based on the principle, "if they could, they would". This is a paradigm shift in thinking about behaviour that focuses on empathetic relationships, student autonomy, and building competence in skills that may be lagging. This model honours the adolescent need for status and respect by inviting them to participate in solving their own problems and lessons the hierarchical threat of powerlessness from authority. This is a research-based approach to school wide policies that supports trauma informed practice and adolescent development. Additional information and support can be found on the website Lives in the Balance.

Resource	Description
Katz, J., & Lamoueux, K. (2018). Ensouling our schools: A universally designed framework for mental health, well-being, and reconciliation. Portage & Main Press. *Science & Pedagogy / Practical Strategies*	In this resource, Jennifer Katz "presents a universally designed framework for creating schools that engender mental, spiritual, and emotional health while developing intellectual thought and critical analysis". She promotes healthy school culture through the use of the Three Block Model of Universal Design for Learning (UDL) within which, 4 important threads emerge: spirit & soul in education; Neurology, Trauma, Well-Being, and Mental Health in our Schools; Truth, Reconciliation, and Indigenous Worldviews of Education for Well-Being; and Leadership for inclusion and UDL. Relying on her experience as a teacher in Manitoba and research, she provides an alternative lens through which to view education, invites educators to make a shift in pedagogical practices, and offers specific, ready to use, lesson plans for teachers. She incorporates the Circle of Courage and addresses Maslow's (mis)interpretation of the Siksika hierarchy of needs.
Katz, J. (2021, March 23). The three-block model of UDL. Home of the three-block model of UDL and the RD program. http://www.threeblockmodel.com/the-three-block-model-of-udl.html *Pedagogy / Practical Strategies*	The three block model (TBM) for universal learning provides a framework for educators to promote inclusion and diversity, through community building and the creation of a positive school culture. It blends academic and social inclusion through lessons designed to promote meaningful participation and interactions. Block One focuses on Social Emotional Learning (SEL) to develop compassionate learning communities. Block 2 addresses inclusive instructional practices including differentiation. Block 3 embraces the educational elephant in every classroom, the systems and structures that can hinder progress. Katz provides practical solutions to challenges, through real-life examples based on her experience as an educator in elementary school, however most resources are easily adaptable to junior high.
Katz, J. (2021, March 23). The three-block model of UDL. Home of the three-block model of UDL and the RD program. https://www.threeblockmodel.com/the-three-block-model-of-udl.html *Science & Pedagogy / Practical Strategies*	The Three Block Model (TBM) of Universal Design for Learning (UDL) website is loaded with videos and resources to support educators.

Resource	Description
The Adolescent Brain: Teaching and Learning in Junior High https://np1.nearpod.com/sharePresentation.php?code=af7583f8806b67ef04c624cd2e91865d-1 *Science, Pedagogy & Practical Strategies*	I created this PD to cover the essential knowledge of adolescent brain development (the what), why common interventions and teaching strategies are not effective during this stage of development (the so what) and teaching strategies that can be used to increase engagement, motivation, and learning (the now what). This is a 45–60-minute PD (60 minutes if using the interactive Nearpod platform), based on the resources listed above, that serves as an introduction for junior high teachers. Additional PD on EF and Trauma/ACEs will be the next steps.
The Neurobiology of 'We' How Relationships, the Mind, and the Brain Interact to Shape Who We Are *Science & Pedagogy*	Only available as an audiobook, however, worth the listen as Dan Siegel maps out the Neuroscience of relationships and the importance of neural integration in the development of who *we* are. The main idea is that our relationships shape neurobiology and identity (brain and mind) through experiences. This idea is supported by the big ideas of attachment theory, memory, chaos theory of differentiated/connected systems, and mindfulness. For teachers, this is a fantastic resource supporting the adolescent need for positive relationships for brain development during this sensitive period of brain plasticity.
Trep Project https://www.trepeducator.org/new-books *Science, Pedagogy & Practical Strategies*	Trauma Responsive Educational Practices "The TREP Project was launched in 2016 with a ***policy brief*** on the educational consequences of the chronic toxic stress of living in high crime communities. The TREP Project works to develop the individual and organizational capacity of educators and schools serving children growing up in neighborhoods that have high levels of toxic stress, such as violent crime, concentrated poverty, concentrated foster care involvement, and housing instability" (https://www.trepeducator.org/about-the-project) Provides resources, books, and articles for trauma responsive education and educator self-care.

Resource	Description
Yeager, D. S., Dahl, R. E., & Dweck, C. S. (2017). Why interventions to influence adolescent behavior often fail but could succeed. Perspectives on Psychological Science, 13(1), 101–122. https://doi.org/10.1177/1745691617722620 *Science & Pedagogy / Practical Strategies*	Adolescent specific, research based, insight into how to harness the unique neurobiology of the adolescent brain to increase engagement and motivation of adolescent learners and increase the efficacy of interventions and classroom lessons. The authors focus on the developing social brain through respectful interactions and posit that honouring the sensitivity to status & respect, lessening the influence of respect threats, and increasing respectful interactions with adults result in increased student engagement and motivation.
You 101 *Science, Pedagogy & Practical Strategies*	A Brain unit to help teach students about brain development, and the development of, well, themselves. This "work in progress" focuses on the interconnectedness of the brain, mind, and behaviour through lessons, videos, and discussion about brain basics, neural plasticity, emotions, the social brain, mindset and our behaviour and actions.
Zones of Regulation Should I or Shouldn't I https://www.socialthinking.com Zones of Regulation - Nearpod / Slide Deck *Practical Strategies*	This website is dedicated to social thinking and strategies to develop social communication skills. It is loaded with information, resources, and training to help all educators in teaching Social Emotional Learning (SEL). Two products I have used (see slide deck and near pod lessons included) as both universal classroom lessons and small group interventions are the Zones of Regulation Book and a game, Should I or Shouldn't I. I believe all teachers can find value in these resources as they are easily tailored to fit junior high health classes and can serve as "common language" for junior high behaviour support plans.