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Executive Functioning Essentials for Educators, Parents and Caregivers

By

Sarah Beselt

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We accept this Graduate Applied Project as conforming to the required standard.

Mary Ann Richards, PhD  
Graduate Applied Project Faculty Supervisor  
Faculty of Education,  
Vancouver Island University  
Date: February 5th, 2021

Dr. David Paterson  
Dean, Faculty of Education  
Vancouver Island University  
Date: February 5th, 2021
Abstract

Executive functioning (EF) plays a central role in our daily functioning. These brain based cognitive processes allow us to regulate behaviour, make decisions, set and achieve goals and to exhibit a host of other essential skills. Due to complex factors that interact to effect EF development and acquisition, performance of key executive skills varies greatly between individuals. Educators and caregivers need to be aware of the impact that EF challenges can have in order to provide appropriate supports, scaffolding and interventions. The goal of this applied project is to provide relevant information and tools for teachers to use within their classrooms and schools to support and enhance EF, while providing resources and reference material that can be shared with colleagues and caregivers.
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Chapter One- Introduction

Looking to the future and considering the past, it is evident that we live in a world of rapid change. The elements that drove the 20th century economy and culture have been transformed as we embrace a digital world and an interconnected global network. Thriving in our current society requires different skills and abilities than previous generations. In order to meet these evolving demands, we need to create an education system that prepares students to meet and embrace the world of the future. By envisioning how life will continue to change in the 21st century we can determine the skills that tomorrow’s generation will need. An ambitious endeavour involving millions of global stakeholders from diverse sectors rallied together to identify 21st century skills and promote evidence-based change in educational policy and practice. This initiative, named Partnership for 21st Century Learning, identified the need to expand from the traditional teaching of core subjects to equip students with 12 essential capabilities that they will need to succeed in the future (Batelle for Kids, 2019). Critical thinking, flexibility, initiative, communication, social skills and collaboration were some of the identified skills. These skills will require high level executive functioning (EF) and an innovative approach to learning. Through implementing inclusive strategies grounded in the evidence drawn from brain research, we can create classrooms and educational communities where these skills are developed and enhanced. As early functioning of these capacities is predictive of future health and wellness (Diamond, 2013), a focus on supporting and increasing executive functioning capacity can build the foundation for future success in life, learning, relationships and livelihood.

21st Century Learning and Executive Functioning

Strong cognitive processes that allow us to regulate our behavior, make decisions, and set and achieve goals will underpin 21st century skills. Synonymous with EF (Diamond, 2013), these
skills must be a foundational component of today’s educational goals. Although we are not born with these skills, we are born with the capacity to develop them (Center on the Developing Child at Harvard University [n.d.]). Influenced by both biology and experience, each child has unique strengths and challenges in executive functioning. Recognizing that these functions are brain based, it is important to understand that they are not a reflection of will or character. Developing and enhancing these skills should be a key component of all future oriented educational frameworks and of every modern learning environment.

As schools and classrooms become more diverse and inclusive, the strengths, needs and EF capacities of the student population will become increasingly varied and heterogeneous. This provides the education system with the unique opportunity and challenge of implementing pedagogies based on universal design that can be adapted flexibly to meet the needs of individual students. Understanding the impact that EF has on learning and daily functioning in addition to the predictive value and future importance of these skills precipitates the need for immediate action to remediate curriculum and practices that fail to meet the needs of our current classrooms and changing world.

**What is EF?**

Currently there is no universally accepted definition of EF. However, many similar and overlapping definitions and frameworks exist to explain the hypothesized cognitive processes and resulting skills that comprise executive functions. Agreement exists that EF can be viewed as the brain-based, cognitive processes that help us to regulate our behavior, make decisions, and set and achieve goals (Barrasso-Catanzaro & Eslinger, 2016; Barkley, 2012; Best & Miller, 2010; Center on the Developing Child at Harvard University, n.d.; Diamond, 2012; Diamond & Ling, 2016).
There is broad consensus that there are three core executive skills: Working memory, inhibitory control, and cognitive flexibility. These in turn work together to achieve higher order capacities including reasoning, problem solving and planning (Center on the Developing Child, 2012; Diamond 2012, 2013; Lehto, Juujarvi, Kooistra & Pulkkinen, 2003; Miyake, Friedman, Emerson, Witzki & Howarter, 2000).

Some practitioners prefer to explain EF in terms of the skills that result from these functions (Dawson & Guare, 2009, 2012; Guare, Dawson & Guare, 2013; Kuypers, 2011; Meltzer, 2018) including response inhibition, memory, emotional control, flexibility, sustained attention, task initiation, planning, organization, time management, goal-directed persistence and metacognition. These skills are essential for day-to-day functioning as well as academic and vocational success.

**Rationale for the Project**

As our understanding of EF has developed and evolved over the past several decades, individual educators and schools are at different points in their journey of understanding of EF and of implementing strategies and structures to support the development of these skills. Additionally, recent changes to the British Columbia Education Curriculum (and recognition of the benefits and need for inclusion and diversity in the classroom) have underscored the importance of teaching and supporting these skills. These changes are designed to “engage students in their own learning and foster the skills and competencies students will need to succeed” (British Columbia Ministry of Education, 2018, para. 1). This is achieved through a Know-Do-Understand model that supports a “concept-based competency-driven approach to learning” (British Columbia Ministry of Education, 2018, para. 11). It focuses on the
development of skills, strategies and processes (Do) in addition to curricular content (Know) so that students can understand principles and generalizations (referred to as Big Ideas).

To support the practical implementation of this type of curriculum, educators can utilize a framework such as the Universal Design for Learning (UDL) (CAST, 2018; Katz, 2012; SET-BC, 2019) addresses EF through practices that promote inclusion and diversity. Aspects of EF are specifically addressed within this framework while the overarching theory is backed by research from disciplines including neuroscience, learning theory, cognitive psychology and the works of developmental psychologists such as Vygotsky and Piaget. Research studies by Best and Miller (2010), Blair (2016), Brocki and Bohlin (2004), and Sherman et al. (2014) describe the developmental trajectory of EF and highlight the capacity for continued development of these core skills throughout adolescence and into early adulthood. Thus, the school-age years are critical times for capitalization of resources and interventions to support this development. Expanding upon the guideline’s recommendations, educators can glean information from other sources that promote tools and strategies consistent with the principles and research behind UDL.

With the growing body of research supporting the pivotal role of EF in school and career success as well as mental and physical health (Diamond & Ling, 2016; Kaufman, 2011), an increasing number of strategies and tools are being developed for use in school, home and community settings. The work by prominent practitioners in the field (Dawson, 2003, n.d.; Dawson & Guare, 2009, 2012; Guare, Dawson & Guare, 2013; Kuypers, 2011; Meltzer, 2018; Ward, 2019; Williams & Shellenberger, 1996; Winner, 2005) can be used as a springboard for bringing EF teaching and support across a variety of contexts. Combined with knowledge gained through reading published literature and reputable online resources (Barkley, 2012; Center on the Developing Child at Harvard University, n.d.; Diamond, 2012; Guare, 2014; Jaraoslawska,
Gathercole, Allen & Holmes, 2016; Moriguchi, 2014; Taylor & Trott, 1991 [as cited in Williams & Shellenberber, 1996]; Wright & Diamond, 2014; Zelano, 2015), a toolbox of appropriate visuals, scaffolds, graphic organizers, teaching tools and communication strategies can be implemented that fit within a UDL framework.

As schools and individual educators implement these strategies and frameworks, it is important to consider how parents, caregivers and families can be included in the dialogue. Looking to Bronfenbrenner’s Ecological Systems Theory (1979) for understanding, we can see that beyond the individual child exists a microsystem that includes families and caregivers as well as the school community. As repetition throughout the day and across settings and activities is key to developing these skills (Diamond, 2013), communication between the home and school can allow for consistent practice and mutual understanding of the importance of EF and strategies to support their development.

Executive functioning challenges are frequently seen in commonly occurring disorders including Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Fetal Alcohol Spectrum Disorder (FASD) and other neurodevelopmental disorders (Barasso-Catanzaro & Eslinger, 2016). It is important to note that neurodevelopmental disorders such as these affect 7-14% of all children in developed countries (Miller, Shen & Masse, 2016). Considering the importance of EF in academic, social, and emotional functioning, children with diagnosed or suspected neurodevelopment disorders need support, understanding and patience from teachers, families, and those with whom they frequently interact. Within inclusive classrooms, this will mean needing to integrate strategies and structures that provide EF support throughout student learning. Professional development opportunities and team collaboration efforts will be important for this endeavor to be successful.
This applied project addresses the EF needs of students through professional and parental education and through specific strategies to support common EF challenges. Consistent with the Three Block Model of UDL (Katz, 2012), it addresses systems and structures (professional development), instructional practices, and social and emotional learning (tools to help in developing self-concept, valuing diversity and democratic classroom management techniques). Although the project is primarily designed to be implemented by school staff as a tier one strategy using the UDL guidelines, the content may also be beneficial for parents or caregivers in home and community settings. Through creating a common understanding amongst educators and caregivers and encouraging universal implementation of appropriate terminology and techniques regarding EF, we can begin to build the skills and capacities that our students will need in the 21st century.

Overview of the Project

The question guiding this project is, *How can we build understanding of the importance of EF in school communities while providing practical tools and strategies to support them and facilitate their development?* This is answered through an in-depth literature review, a workshop series consisting of PowerPoint presentations and accompanying handouts, a brochure for families or caregivers, and a toolbox of support strategies with detailed explanations and associated visuals. The workshop series is designed for educators and support staff working with students in a classroom setting and is intended to be delivered over several sessions but is adaptable based upon the amount of time that is available and the needs or strengths of participants. Family involvement and school-home communication is facilitated through a brochure that outlines EF and provides strategies for parents and caregivers to use in home and
community settings to support EF and enhance its development. The toolbox of strategies to support EF can be used in a school or home setting, depending on the specific needs and context.
Chapter Two- Literature Review

The purpose of this literature review is to define executive functioning (EF), explore current conceptual frameworks, and to examine what research has revealed about the development of EF. Additionally, it will present findings on the most effective strategies to support and facilitate growth of EF in school-age children.

Theoretical Framework

As previously stated, there is no universally accepted definition of executive functioning. However, there is wide acceptance of the understanding that EF can be viewed as the brain-based, cognitive processes that help us to regulate our behavior, make decisions and set and achieve goals (Barrasso-Catanzaro & Eslinger, 2016; Barkley, 2012; Best & Miller, 2010; Center on the Developing Child at Harvard University, n.d.; Diamond, 2012; Diamond & Ling, 2016). Adele Diamond and her colleagues at the Cognitive Neurosciences Laboratory at the University of British Columbia have developed a conceptual and theoretical framework to expand upon this definition and to provide understanding of the how the components of EF express themselves independently and collaboratively. A comprehensive review of literature and research was published by Diamond (2013) that supported this framework and presented a visual model to explain EF. This model is based upon the principle that EF is comprised of three main components: inhibitory control, working memory (WM), and cognitive flexibility. Her framework theorizes how these components work together to achieve higher order capacities including reasoning, problem solving and planning.

She begins by explaining inhibitory control as “being able to control one’s attention, behavior, thoughts, and/or emotions to override a strong internal predisposition or external lure, and instead do what’s more appropriate or needed” (Diamond, 2013, p. 2). We rely on inhibitory...
control to selectively attend to relevant stimuli while filtering out a multitude of other noises, visual distractions and sensory interferences. Through selective, focused attention we are able to intentionally, voluntarily ignore irrelevant incoming information. Inhibitory control also involves cognitive inhibition of thoughts, ideas and memories. Additionally, we are able to exhibit self-control through inhibition of emotions and behaviours so as not to act impulsively or inappropriately in a given situation. When we are required to complete or stay focussed on a task, inhibitory control is essential. Inhibitory control typically follows a developmental progression and improves from birth into adulthood before declining later in life (Diamond, 2013).

Diamond (2013) continues by examining working memory (WM) and its role in EF. We rely on WM to hold information in our mind so that we can mentally manipulate it. Comprised of verbal and non-verbal WM, it is essential for tasks including mathematical calculations, remembering and ordering instructions, and making connections between ideas or concepts. Brain imaging studies show that WM relies primarily upon the dorsolateral prefrontal cortex. Working memory is distinct from short-term memory which does not involve the manipulation of information and relies on a different neural subsystem (the ventrolateral prefrontal cortex). As with inhibitory control, it follows a development trajectory that typically begins in infancy and improves into adulthood before declining later in life. Diamond (2013) describes the relationship between inhibitory control and WM and notes that they generally support and rely on one another while remaining distinct and separate functions.

The third component of EF discussed by Diamond (2013) is cognitive flexibility. This function builds upon the other two and appears later in development. Cognitive flexibility is required to change perspectives spatially, conceptually, and interpersonally. It allows us to adjust
to shifting demands and to think of ideas and concepts in novel and unique ways. Finally, she presents her belief that these three core skills work together to allow higher-order EF such as reasoning, problem solving, logic and planning.

Her review concludes that EF can be improved but is inconclusive as to whether a specific program or methodology is most effective. She underscores that EF functioning early in life can be predictive of long-term achievement, health, wealth, and quality of life and that EF are trainable and can be improved at any age (Diamond, 2013). Consequently, future research and innovation should be directed toward better understanding of how EF skills develop and what can be done to facilitate their development while more in-depth study and understanding is required to identify which brain structures, neurotransmitters, hormones and medications are involved in their mediation.

**Development of Executive Functioning**

An article published in 2016 by Barrasso-Catanzaro and Eslinger addressed some of the gaps in understanding identified by Diamond (2013). Their article describes the etiology of EF and pinpoints some of the key brain systems involved in its development. It is important for educators and caregivers to understand that EF is a neurologically based capacity that is affected by a host of complicated and not yet understood factors. As such, it is not a reflection of effort or character and, thus, interventions and supports need to be directed appropriately. “The development of these capabilities is dependent upon the anatomical and physiological integrity of specific brain areas and their connections” (Barasso-Catanzaro & Eslinger, 2016, p. 109). Through brain imaging studies and clinical case studies involving individuals who have suffered early prefrontal cortex damage, researchers are able to identify some of the specific structures involved in EF. They have also been able to add to the growing body of evidence that supports
the hypothesis that maturation of functioning is affected by neurobiological factors of anatomy and physiology as well as by experience-dependent factors that shape the development of the vast network of interconnections between the prefrontal cortex and other key brain structures. White matter expansion that typically happens during development is another key factor in allowing the growth and improvement of connections between brain regions. These connections are fundamental to the formation of cognitive functioning and behavioural maturation (Barasso-Catanzaro & Eslinger, 2016).

Atypical development of these key structures and connections is seen in commonly occurring disorders including Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Fetal Alcohol Spectrum Disorder (FASD), and other neurodevelopmental disorders (Barasso-Catanzaro & Eslinger, 2016). This atypical development is likely a key factor in the EF challenges faced by individuals with these conditions which affect 7-14% of all children in developed countries (Miller, Shen & Masse, 2016). In addition to EF challenges, atypical neural development is linked to deficits in theory of mind (Barasso-Catanzaro & Eslinger, 2016). Theory of mind allows us to perceive and appreciate another person’s thoughts, feelings, ideas, intentions and beliefs. Critical for academic, social, and emotional functioning, students with neurodevelopmental disorders who have not yet developed these capacities need support, understanding, and patience from teachers, caregivers, and other key individuals.

Barasso-Catanzaro and Eslinger (2016) acknowledge that many factors affecting neural development are uncontrollable; however, they argue that certain influences have the potential to be changed or modified. These include preventing prenatal drug and alcohol exposure; protection from traumatic brain injury caused by accidents, abuse, sports, concussions, and impulsive actions; and protection from psychosocial adversity including chronic stress and environmental
deprivation. Providing infants and children with nurturing support and buffering them from stress has been shown to be a protective and essential for neural and behavioural development (Gunnar, Hostinar, Sanchez, Tottenham & Sullivan, 2015).

The Centre for the Developing Child at Harvard (2012) presents similar findings to those of Barasso-Catanzaro and Eslinger (2016). They summarize by stating “the critical factors in developing a strong foundation for these essential skills are children’s relationships, the activities they have opportunities to engage in, and the places in which they live, learn, and play” (para. 4). Positive supporting relationships, social connections, frequent modelling of and opportunity to practice a variety of skills and behaviours, and a stable environment that provides felt safety and offers spaces to explore are all important protective factors in neurological and EF development. Conversely, they note that exposure to adverse or traumatic experiences can impair the development of EF and the behaviours and skill that rely on its development.

Assessment of EF

As there is no universally agreed upon operational definition or framework for viewing EF, there is not one specific test or assessment that can decisively evaluate EF. Attempting to assess EF solely at the level of cognition is inapplicable and irrelevant as it fails to consider the depth and breadth of impact that these have on functioning, affect, relationships and other facets of life and development (Barkley, 2012). Additionally, EF has a complex interaction with culture and belief systems which makes assessment highly subjective and context dependent. In spite of these challenges, there is acceptance across disciplines of the importance of EF. Depending upon the situation and individual, we can use various assessment tools to gain insight into the type and magnitude of impacts so as to develop the most appropriate ways to support and enhance functioning (Meltzer et al., 2018).
One category of tests are standardized neuropsychological tests which rely on performance measures to assess EF. They require being administered in a quiet setting by an adult that is familiar with the tool (and possibly with requisite training), following specific guidelines and using separate, structured tasks (Meltzer et al., 2018). Although these tests may be helpful to reveal areas of relative strength and weakness, they have limited ecological validity and transferability to other settings such as school and day-to-day functioning. Such tests fail to assess or account for the multi-factorial components of EF that are required for completing complex tasks or the instability of EF based on emotions, environment and period of time (McKinney et al., 2019). However, when used in combination with other assessment types, they may provide valuable information.

Another category of assessments that provide information about an individual’s EF are those that employ behaviour rating scales. These are typically parent, teacher, and/or self-reports that ask respondents to rate frequency of various behaviours that reflect the employment of various EF processes. Several such scales exist, with the most frequently used being the Behaviour Rating Inventory of Executive Function Second Edition (BRIEF2) (Meltzer et al., 2018). Although there is not a direct correlation between performance on neuropsychological tests and behaviour rating scales, there is evidence to support behaviour rating scales as valid tools for assessing EF. A study by Isquith et al. (2013) examined available data and relevant statistics to determine whether there was adequate evidence to support the use of the BRIEF2 for assessing EF in children. They made several conclusions based upon their study. Firstly, behaviour rating scales of EF are accurate reflections of an individual’s EF abilities in real, everyday life. Secondly, the results of behaviour rating scales correlate accurately with other known biological markers viewable by neuroimaging (such as low frontal lobe volume and focal
frontal brain lesions). Finally, although it is difficult to find consistent, specific correlations between performance-based measures and behaviour rating scales, broad correlations exist indicating that it is beneficial to use both tools concurrently for assessment so as to obtain a more comprehensive picture and understanding of an individual’s EF (Isquith et al., 2013).

**EF and Education**

As the understanding of neurodevelopment evolves, so too does the discussion and consideration of EF and its impacts on learning and academic functioning. Education is a key part of children’s and adolescents’ lives. Educators can improve how they teach and support students if they understand the relationship between EF and academic functioning. Barasso-Catanzaro and Eslinger (2016) discussed the frequent comorbidity of EF challenges and commonly occurring neurodevelopmental disorders such as ADHD, FASD and ASD which impact a large percentage of students (Miller et al., 2016). It is important to note, however, that EF challenges manifest in a variety of forms and intensities and can impact both typically and atypically developing children (Riccio & Gomes, 2013; Jacobsen et al., 2011). Given the high incidence of EF challenges, educators need to be equipped and informed as they develop procedures, structures and systems of support for EF within their classrooms and curriculum.

There is a clear link between EF and the skills required to successfully navigate the many facets that comprise education. Knowledge in this field is expanding and evolving, but current research points to the key role of inhibition, working memory, and cognitive flexibility in many academic settings and subject areas.

A study by Gathercole et al. (2006) analysed learning situations of 5- and 6-year-old students as a means of understanding how WM impairments impact learning and performance. They focussed their observations on children who had demonstrated WM impairments based on
standardized scores in a series of tests of WM. The researchers observed and collected data throughout a typical school day over a period of 3 or 4 days. Although they considered several theories of WM in their work, they primarily based their observations on Baddeley’s model of working memory (Baddeley, 2000) as it offered the most detailed, comprehensive framework for understanding WM. Based upon their observations, they noted that the most common challenge facing these students was memory failure which manifested in forgetting information or instructions given verbally by the teacher. This included activities such as forgetting where to put materials shortly after being told or forgetting which task they were supposed to finish following a request from a teacher. Additionally, activities that required students to simultaneously store and process information such as mental math, simultaneously writing a sentence and remembering how to spell complex words or writing down information given orally were also very challenging. Consistent with Baddeley’s (2006) model of WM that includes an episodic buffer to assimilate multiple sources of memory information, they also observed that these students had difficulty remembering specific content from earlier activities when asked later in the day.

Results from this study demonstrate how essential EF is to school and academic functioning. While this study only looked at the WM component of EF, it demonstrates how challenging the classroom environment can be for students with EF deficits.

A literature review by Clancy and Diamond (2008) outlines the principal role of the self-regulatory aspects of EF in determining school success. They define self-regulation (SR) as “the primarily volitional cognitive and behavioral processes through which an individual maintains levels of emotional, motivational, and cognitive arousal that are conducive to positive adjustment and adaptation, as reflected in positive social relationships, productivity, achievement, and a
positive sense of self” (p. 900). They present clear evidence for the necessity of these skills in successful classroom and social participation at school while also explaining the foundational role of SR in attaining and engaging in academic skills and content acquisition. Young students who were not able to maintain optimal states of SR were poorly adjusted in the classroom while also displaying lower abilities in reading and math. Additionally, children who were lacking these core EF skills were more likely to go on to demonstrate symptoms of anxiety, disengagement in learning, and overall poor classroom and school adjustment. When students are not able to successfully meet the academic and behavioural expectations, they display higher levels of avoidance and resistance to school, placing them at greater risk for developing a negative pattern of experience which is associated with higher levels of school dropout and lower general academic achievement. Conversely, those children with more developed SR were more likely to be successful at meeting behavioural and academic demands which led to a positive cycle of achievement and affirmation from teachers and peers. Conclusions from their review emphasize that rather than focusing on acquisition of academic knowledge in young children, emphasis should be placed on promoting and developing SR, particularly amongst those that are at higher risk of EF challenges due to comorbid conditions, stressful and traumatic life experiences, or environments that lack the positive relationships and experiences that promote EF and SR development. Their findings indisputably linked high EF with classroom, academic, and general overall positive achievement.

**Programs and Interventions to Support Development of EF**

There are many programs and interventions that have been developed to support the development of EF. However, not all of these programs have been proven to be successful. Diamond and Ling (2016) conducted a review of 84 studies to determine what separated
programs that were successful at improving EF from those that were not. Rather than specifying a program that was most successful at improving EF, their review highlighted considerations that need to be addressed within any program or method. They were able to make several conclusions based upon their study. Firstly, specific EF training programs such as computerized working memory training have minimal transferability to skills and situations beyond the actual trained task. The lack of transferability means that measurable improvement will have a narrow scope of impact outside of the specific skill and setting of the training. Secondly, even when programs have been proven to be successful at improving EF, the extent of the gains are dependent upon time spent practicing skills and implementing program strategies—increased practice is correlated with larger margins of improvement. Thirdly, they concluded that how an activity or program is presented is just as important as the content of that program. This points to the importance of factors such as the personal characteristics of the leader, including attitude and demeaner, to the success of specific initiatives. Additionally, if individuals desire to continue improving EF, they must also continue challenging and pushing to a higher level of EF competence for ongoing improvement to be seen. Once this ongoing practice ends, benefits may shrink. Their final conclusion offers encouragement and hope for those that may seem furthest behind: Individuals that showed the greatest need for improvement also showed the largest gains in EFs through program participation.

A study by Riccio and Gomes (2013) also sought to identify which interventions showed the most promise and benefit for children and adolescents with executive functioning challenges. They included a broad array of intervention types in their study, including the broad categorical approaches of 1) pharmacology, 2) metacognitive, cognitive/behavioural, 3) computerized programs, 4) neurofeedback, and 5) combination approaches. As EF is an umbrella term that
includes many processes and skills, they noted that intervention success is specifically related to the type and extent of EF deficits or challenges of any given individual. Although they had hoped to offer more specific recommendations through their study, they were unable to reach any reliable conclusions about the most effective form of intervention. They did note that many interventions have been successful with certain populations or individuals. In order to generalize these findings, however, further research is needed involving larger and broader groups of participants, clearer program parameters and more specific, research backed assessment tools.

The results of both Diamond and Ling (2016) and Riccio and Gomes (2013) underscore the importance of continuing to strive to discover which interventions are most beneficial for supporting EF development. Of encouragement, however, was the ability of both studies to conclude that EF improvement is achievable given the appropriate type, intensity, and duration of intervention. Given their pivotal role in daily functioning and position as predictor of future wellbeing (Diamond & Ling, 2016), we must pursue research in order to best support child and adolescent learning and development.

**Supporting EF Through UDL**

While research continues in the field of interventions and practices that support development of EFs, educators need to be provided with specific strategies that can be offered in the classroom and school setting to immediately benefit students that are lacking key EF skills while supporting the diverse needs and learning styles of all students. One way of achieving this is through a curriculum design that embeds principles and practices that support EF. The Universal Design Framework (UDL) is one framework that has been developed to support EF through three principles of 1) representation, 2) action and expression, and 3) engagement (CAST, 2018). This framework was designed based on research from the fields of neuroscience,
the learning sciences, and cognitive psychology. The three key principles reflect recent neuroscience research that recognizes that three different networks of the brain that are involved in various aspects of learning. These correspond, respectively as the 1) recognition 2) strategic and 3) affective networks in relation to each principle. With the goal of eliminating barriers to learning and participation, UDL facilitates a flexible process of teaching and learning that is reflected in the guidelines and checkpoints that comprise each of the principles. As classrooms continue to become more diverse and inclusive, educators can adapt to a pedagogy that is accessible and, by design, provides entry points and opportunities suitable for this evolving landscape.

To understand how EF is promoted within UDL, Garcia-Campos et al. (2018) analyzed the principles, guidelines, and checkpoints that comprise the framework to determine how frequently they supported or addressed 12 key EF skills. The skills considered were feedback response, planning, metacognition, organisation, cognitive flexibility, self-regulation, initiative, abstract reasoning, inhibitory control, working memory, attention, and risk-benefit processing. Their results indicate the Principle One (which addresses representation and supports the recognition network) included a total of three checkpoints within two sets of guidelines to support working memory and abstract reasoning. Strategies that activate the strategic network of the brain through providing multiple means of action and expression support EF implicitly and explicitly in five checkpoints spanning two separate guidelines. Principle Three supports the affective network through providing multiple options and opportunities for engagement. It supports EF throughout its guidelines, as emphasized in eight of nine checkpoints that collectively supported nine of the twelve EF skills surveyed in their study. They were able to conclude that implementing a UDL framework simultaneously ensures that principles and
practices that support EF will be embedded in the learning process. “UDLs implementation allows for the development of a more accessible curriculum with room for different ways of organising, designing, developing and following up the teaching-learning processes; offering students greater flexibility, making their involvement possible and succeeding when confronting the educational challenge of adapting to the biggest range of variability present in the classroom” (Garcia-Campos et al., 2018, p. 670).

**Environmental Interventions and External Strategies to Support EF**

Teachers or schools that have not yet implemented the UDL framework can still employ specific strategies that will support the EF needs of students. One way this can happen is through implementing environmental supports or scaffolding (Center on the Developing Child at Harvard University, 2011). This includes changing the physical or social environment, modifying tasks, providing prompts, or changing how adults or teachers interact with the child (Guare, 2014; Dawson & Guare, 2009, 2010). Within a UDL framework, this can be implemented at the classroom level to benefit all students, with the opportunity to intensify or target supports depending upon the task or context. For example, a classroom that is physically designed with minimal visual or auditory distractions, clear teacher-student sight lines, organization that encourages student organization and minimizes working memory and inhibitory load, while utilizing flexible groupings and seating, benefits all students while increasing the opportunity for students with EF challenges to be successful. In some cases, modifications may need to happen at the individual level, such as preferential seating near the teacher or away from windows and doors (to minimize distractions and decrease inhibitory demands).

Changing the nature of the task can often be achieved at a class-wide level with more intense support for certain students. As stated by Dawson and Guare (2010), many of these
modifications are consistent with differentiated instruction. This is done through “flexible groupings, ongoing assessment and adjustment, and the use of tasks differentiated by content, process and product” (Dawson & Guare, 2010, p. 53). Specifically, students can be offered written lecture notes, written instructions, assignments that are broken down into subtasks with specific timelines, scaffolding through graphic organizers, modeling, use of examples and manipulatives, and marking or scoring rubrics with explicit checklists of requirements.

Many students benefit from prompts or cues, especially when facing new or novel tasks and situations, or when there has been a change from previous expectations (Dawson & Guare, 2010). These may come in the form of verbal prompts, visual cues, schedules that use pictures when appropriate, lists with or without graphics, alarms or reminder on a phone or device, and specific gestures or body language from the teacher. The goal with each of these cues and prompts is to gradually move from external supports to internal cues so as to increase independence and encourage utilization and development of EF.

Finally, Dawson & Guare (2010) emphasize the importance of changing the way adults interact with students. This should be done before, during and/or after tasks and situations to be effective. It includes providing developmentally appropriate levels of support and supervision, modelling appropriate use of EF skills and use of corresponding supports that facilitate these skills (calendar, reminders in phone), modelling and allowing time to practice desired behaviour, giving appropriate praise, and asking questions that promote executive skill development.

Three separate studies, each involving varied age groups (kindergarten, middle school and university aged students), validated the use of environmental modifications to support a range of EF skills. The first study, by Gathercole et al. (2006), observed five and six year-olds in a kindergarten classroom. Focussing on the WM component of EF, they found that situations
demanding high WM load (often occurring in curricular areas of English and mathematics) resulted in learning failure that most often manifested as forgetting instructions, inability to simultaneously manage processing and storage demands of the task or activity, losing track in complex tasks, and (as defined in Baddeley’s model of WM (Baddeley, 2000; Repovš & Baddeley, 2006) frequently forgetting information from episodic long-term memory. To decrease demand on WM and increase student success, the researchers recommend three key environmental modifications. The first is to ensure that the child can remember the task through keeping instructions simple and brief, breaking down longer instructions into smaller parts when possible, and having the students repeat back the instructions to the teacher which increases success of later retrieval of key information. Their second involves using external memory aids such as blocks for counting, word banks, instructions and spelling words provided on the child’s desk as opposed to on a board, and using tools that help the child keep their place while reading or completing copy work. Finally, they suggest modifying tasks to make them shorter or less complex so that WM is not overwhelmed, thus providing the opportunity for learning, growth and success- each of which will build upon the child’s chances of future success and EF development.

A study by Jacobson et al. (2011) examined the role of EF in the successful transition of students from elementary to middle school. Utilizing a sample of sixth grade students obtained from a larger study of child and youth development, researchers were able to access previous longitudinal data assessing EF performance at multiple stages from preschool up to the present age. They conclude that EF measures were predictive of academic and social adjustment in grade six. Although they acknowledge the complexity of factors leading to the development of EF, they concluded that providing specific environmental supports to students within a classroom
setting can significantly improve academic and social functioning of those students with EF difficulties.

To understand the effect of providing environmental modifications to older students and young adults with EF challenges, Rivera et al. (2019) conducted a study to look specifically at the effect of adopting EF support strategies on study outcomes of college students with identified EF challenges. Participants in the study were trained in the use of task analysis and goal setting interventions as a means of improving goal setting and achievement during independent study sessions. These included a study-planning sheet that allowed the students to document their objectives for their study session, a student task analysis sheet to help them plan, monitor, and reflect on their session, an Ipod with an alarm set for midpoint of the session, and a computer equipped to create graphs to plot performance using the information that the student entered from their session. Results from the study showed that using the tools improved the number of tasks and goals that the students were able to complete. Additionally, the participants reported that the intervention was helpful in managing their study time and completing self-selected goals. These results supported their supposition that systematic instructional strategies and external supports can improve the ability of students with EF challenges to develop and define goals as well as self-monitor in order to stay on task and complete the identified goals. This supports the evidence from other studies that appropriate environmental modifications can be beneficial to support students with EF challenges.

**Family/Caregiver Involvement**

Using Bronfenbrenner’s (1977) ecological systems theory as a framework for understanding human development, we can see that the child exists within the interworking systems and influences of home, school and community. An ecological systems theory of
successful inclusive education considers the influence of these systems, recognizes their interrelations and influences, and applies these principals to developing partnerships involving family, school and community (Xu, 2020). Xu (2020) explored family-school-community partnerships and the engagement of families of children with disabilities. This research concluded that active family involvement is essential for successful family-school-community partnerships. Successful partnerships result in positive outcomes for children and families in both immediate and long-term ways (Xu, 2020). However, it is important to recognize the unique characteristics of families as this will impact their needs, priorities, and the type of resources and support they require or prefer.

Further support for family involvement and partnership development with schools was found in a meta-analysis of studies that looked at academic outcomes and parental involvement (Ma et al., 2016). The results from the analysis revealed behavioural involvement, home supervision, and home-school connections are the three keyways to promote parental involvement in learning outcomes. Partnership development between schools, families, and communities can be facilitated through respectful relationships between school staff and organizational culture, practices and programs that are structured to promote family-school-community partnerships, and the development of capacity within the school to engage effectively with families. When there is increased parental involvement in learning outcomes and effective partnerships between schools, families and communities, connections and continuities are developed amongst contexts, leading to a positive impact on the development and educational success of the child (Ma, Shen, Krenn, Hu & Yuan, 2016).

Conclusions from multiple studies linking parental involvement to school success across all grade levels (Fan & Chen, 2001; Jeynes, 2005, 2007) are equally applicable to special
education students and those with learning disabilities (Yotyodying & Wild, 2019). Research by Yotyodying and Wild (2019) revealed that one of the most effective ways to increase parental involvement is through enhanced family-school communication. Communication that involves ongoing exchanges, easily available contact people, and supportive advice and material that are delivered in an appropriate manner is perceived by families to be key to enhancing their involvement. As educators seek to involve families in supporting EF at home and in the community, these findings provide valuable insight.

**Considerations for Professional Development Regarding Executive Functioning**

Careful consideration needs to be given when developing and implementing professional development (PD) for educators. Research has revealed that PD needs to have certain features to be effective in increasing knowledge and improving teaching practice. These include: focus on content knowledge, active learning, coherence with other learning activities and knowledge, sufficient duration, and collective participation with other staff from the same school, grade or department (Garet et al., 2001; Desimone et al., 2002; Desimone, 2009). These need to be considered in light of the needs of the students, the local context, and the strengths and needs of the teachers involved in PD (McKeown et al., 2019).

An example of the application of this type of PD can be seen in a study by McKeown et al. (2018) that examined teachers’ perceptions and experiences with PD for self-regulated strategy development (SRSD) in writing. As part of a larger study examining PD and SRSD, this study involved a sampling of grade 2 and 3 teachers from rural schools in the southeastern United States who participated in PD for SRSD that was carefully designed to incorporate the characteristics of PD previously mentioned. Following the PD, teachers discussed their reactions to and experiences with the various design elements of the PD in small focus groups using semi-
structured interviews. Based upon the participants’ responses, the researchers were able to conclude that the teachers involved in PD for SRSD in writing felt that the particular characteristics and components of the PD were pivotal to them gaining knowledge and skills for the application of SRSD in writing within their classrooms. These included offering detailed curriculum and instructional material, being personalized, interactive, adaptable, and based upon the strengths and needs of the particular teachers and students, and involving opportunities for active learning and time to practice processes and materials. Indeed, the responses provided reflect what previous research has revealed about the critical features of successful PD. Although the researchers caution that there is not enough evidence to generalize these findings to all types of PD, these results provide a promising framework for continued studies aimed at assessing and improving PD effectiveness.

The results from these studies were carefully considered during the development of my applied project. A key piece of implementing frameworks and strategies that support EF is ensuring that educators have access to appropriate information, resources, and PD opportunities. The applied project that I have developed is rich in content that is designed to be introduced in the context of PD that embodies the research-based aspects of effective PD.

**Conclusion**

Consisting of the brain based, cognitive processes that allow us to regulate behaviour, make decisions, and set and achieve goals, EF is essential to successfully navigate daily life. Because EF challenges affect a large proportion of students both with and without comorbid disorders, educators need to be aware of their impact in order to embed appropriate strategies and structures to support EF within their classrooms. Students that have not yet developed key EF skills must be supported in order to successfully navigate many academic and social settings and
activities. Failing to meet the support needs of these students is known to have a negative impact on their academic performance as well as their long-term achievement, health, wealth, and quality of life. Pedagogical frameworks based upon principles of universal design that embrace evolving understanding of brain development and functioning can allow a diverse student population to succeed in an inclusive educational setting. One approach to equipping educators with the necessary knowledge and tools is through appropriately designed professional development workshops and reference materials. Additionally, enhancing communication and developing partnerships with families and caregivers increases the opportunity for mutual understanding and implementation of consistent strategies to support EF across environments.
Chapter 3- Considerations for Implementation of the Product

This chapter will provide an overview of the project and recommendations for implementation. The product consists of a workshop series of four sessions that are supported by PowerPoint presentations, handouts for educators, a “toolbox handbook” that contains specific support strategies with explanations of each, and a brochure and information handout for families or caregivers. The main intended audience for this product is k-12 educators and support staff; however, included in the product are resources for families and caregivers. The guidelines for implementation are designed to be flexible and adaptable based upon the setting, goals, needs, and strengths of participants.

Overview and Procedure

The majority of the product is designed to be implemented in a group setting where the goal is to provide an opportunity for professional development (PD) through learning, collaboration, and acquisition of new strategies and methods for supporting executive functioning (EF). Consistent with conclusions from recent PD research, the product is content focussed, involves active learning, is coherent with other knowledge and curriculum, is of adequate breadth, depth and content to support sufficient duration of learning (provided that an appropriate amount of time is allocated), and encourages participation with fellow staff. Furthermore, the design allows for flexibility based on the strengths and needs of the students, staff, and local context (Baret et al., 2001; Desimone et al., 2002; Desimone, 2009; Mckeown et al., 2019). The handouts and supplemental materials provide detailed instructional materials, the opportunity to continue to reference the details of the content for reinforcement or meeting changing needs, and the ability to share the information and strategies with other key staff or caregivers of students.
**PowerPoint Presentation**

The PowerPoint presentation gives structure for the introduction of the information as well as a springboard to facilitate discussion and small group activities. The presentation is broken down into five main sections, each beginning with a title slide. The layout and design was carefully considered to allow for flexibility and adaptation while offering depth of content and maintenance of quality. Independently and collectively, they demonstrate the qualities of effective PD (Baret et al., 2001; Desimone et al., 2002; Desimone, 2009; McKeown et al., 2019). The first section, titled “Executive Functioning” gives an introduction and overview of EF, engages participants in a group activity, connects EF to current curriculum and educational goals, and offers strategies to support EF. It will require two to three hours to cover the content, but duration is dependent upon the amount of group discussion and activities and the length of break-time. Using the content of each slide as a guide, participants are able to follow along with corresponding handouts that give further explanation of the concepts being introduced. Opportunities for active learning and collaboration with colleagues are provided through a variety of possible group activities and discussions, while the presentation’s inclusion of questions and references to current curriculum encourages participants to, individually and collectively, make connections between the information provided and their own context or student population.

Following the small group activity slides are three subsequent sections titled “Inhibitory Control”, “Working Memory” and “Cognitive Flexibility”. These sections are designed to be used in follow-up sessions of approximately one hour in length. This could happen within the context of an afterschool meeting or over a series of lunch-time learning sessions. Drawing upon the foundational information provided in the initial presentation, these sections review the three
components of EF while offering information on specific strategies and supports. Ideally these should be implemented in a small group setting where there is the opportunity to discuss the needs of the particular context, and the consider how these strategies might be applied in a practical manner.

**Teacher Handouts**

The teacher handouts provide a detailed copy of the information presented in the PowerPoint presentation. They correspond to the slides in each section of the PowerPoint and can be used as a reference both during and after the presentation. Provision of these handouts allows time for participants to process the information after the presentation, adapt the materials and tools as future situations demand, and reference the content for ongoing personal reflection or as a springboard for continued discussion and collaboration with co-workers (Garet et al., 2001; Desimone et al., 2002; Desimone, 2009).

**Toolbox Resources**

The materials in the toolbox are designed to be explored within the context of small groups. Each tool or strategy is accompanied by an explanation and recommendation for implementation. Due to the large number of strategies and the varying needs of participants, small groups are encouraged to select appropriate resources and then practice implementing as a group. The contents of the toolbox are based upon the application of research and literature (Dawson, 2003, n.d.; Dawson & Guare, 2009, 2012; Guare et al., 2013; Hansen, 2013; Kuypers, 2011; Meltzer, 2018; Ward, 2019; Williams & Shellenberger, 1996; Winner, 2005) to real-life settings and challenges. They primarily consist of external supports, visuals, and strategies designed to support underdeveloped EF skills. Providing scaffolding for not-yet developed EF
skills is very important as it provides students with the opportunity for independence and success in social and academic settings (Centre on the Developing Child at Harvard University, 2012).

These can be used in a class-wide, small group, one-to-one, home, or community setting. Using these tools across multiple settings allows for consistency of language and methods, and increases the opportunity for the generalization of skills (Diamond, 2012; Diamond & Ling, 2016). Although the majority of the strategies are designed for use with younger aged students, they may be applicable for use with older students with EF challenges. The toolbox resources are accompanied by an explanation and suggestions for implementation.

**Caregiver Information**

Recognizing the positive outcomes that result from family-school-community partnerships (Xu, 2020), engagement with families and caregivers is facilitated through a brochure and handout. Although partnerships can be encouraged through several initiatives, communication has been identified as a key to successful partnerships (Yotyodying & Wild, 2019). One effective method of facilitating communication is through providing supportive advice and materials to parents (Yotyodying & Wild, 2019). The caregiver resources included in the product contain relevant information for families on EF while providing a platform for teachers to engage and communicate with families. These resources can be implemented flexibly based upon the needs and context of the family, school, and community. The brochure provides clear introductory information on EF while the handouts offer more detailed material on supporting and developing EF and related skills.

**Purpose of the Project**

The purpose of this project is to:
• increase awareness of the essential role of EF in daily functioning and its position as a predictor of future health, well-being, and success
• to provide information about its development and functioning;
• to link EF with the current curriculum and goals of education;
• to provide tools and strategies to facilitate the support and inclusion of diversity in classrooms and in the community; and
• to facilitate communication and involvement of families and caregivers.

As teachers are often the first to recognize behavioural and learning challenges, they will be better prepared to manage these difficulties if they understand the impact of EF on daily functioning (Centre on the Developing Child at Harvard University, 2012). Children who are impulsive, disorganized, disruptive or disengaged may be labelled negatively by teachers and peers rather than being seen as exhibiting lagging EF skills. This can set up a downward spiral of failure and negative consequences (Gathercole et al., 2006; Jacobson et al., 2011; Center on the Developing Child, 2012) which can have broad, negative impact on a child’s future. If these challenges are recognized as manifestations of poor EF, strategies and structures can be implemented to support EF in a manner that benefits the individual as well as the other students in the class.

Conclusion

This applied project provides a breadth of resources and information on EF that can be used flexibly to meet the specific needs of the individuals and groups who utilize it. The workshop series and handbook provide information about EF and its components while offering practical tools and strategies to support and develop EF across a variety of settings.
Recognizing the high frequency of EF impairment within the general student population as well as the high incidence of EF dysfunction in students with co-occurring learning challenges, educators need to be informed and equipped to meet the needs of diverse learners. Effective professional development that engages participants is key to increasing knowledge and improving practice. As students are influenced by systems both inside the school and within their families and communities, educators can use the family resources to improve the partnerships between these systems through enhanced communication and provision of relevant resources and information for families and caregivers. By providing consistent support for all students, especially those with EF challenges, we are able continue on the journey to becoming inclusive, diverse and healthy classrooms, schools, families and communities.
Chapter 4

Reflection

Regulating behaviour, making decisions, and setting and achieving goals are often skills that we expect our students to inherently learn and demonstrate. Children who do not exhibit these skills can easily be labelled as disruptive, defiant, lazy, and unmotivated. These students can be a challenge to engage in the classroom and may not perform well on traditional exams or homework tasks. Within the home and community setting, these same children are often disorganized, distracted, forgetful, and lacking initiative. Teachers and parents can easily become frustrated when they see these things as a matter of will, character, or purposeful defiance. Unfortunately, a downward spiral of behaviour, self-concept, and success leading to continued negative consequences can occur when these deficits are not recognized correctly as executive functioning (EF) challenges. Both personally and professionally, I have seen these scenarios play out. However, I have also seen the growth and understanding that can develop when parents and professionals are made aware of EF and its impact on life and learning and are equipped with appropriate knowledge, tools and strategies.

I decided to pursue a major project on EF as part of fulfilling the requirements for my Master of Education in Special Education degree because I hoped to be able to increase awareness of the importance of EF and encourage change in the thoughts, attitudes, and actions of educators and parents. When executive dysfunction is viewed as brain-based challenge that can be supported and enhanced through appropriate strategies, we can work together effectively educate and equip our children and students. I hope that through this project, individuals who would have previously received punitive consequences or inappropriate educational or behavioural interventions can be given the chance to thrive and grow in an inclusive and
supportive classroom or home environment. I have seen the relief that can come to parents and educators when they realize that they are not at fault for the challenges the child is having. Instead, many have expressed the sense of empowerment, empathy and understanding that comes through seeing challenges as EF based.

Through the process of completing the project, I have been able to delve into the research behind EF and to examine successful strategies to support their development. This was valuable learning as many of the programs that are being marketed as programs to enhance and develop EF do not currently have any research to back their efficacy. These comprehensive and costly programs are appealing for their promises and product presentation; however, they may not be worth the time or resources if they do not create lasting, generalized improvements in EF.

A lingering question that remains after finishing the project is whether the current class sizes and the high demands facing educators are conducive to supporting diverse and inclusive classrooms. As an advocate for inclusive education, I feel that it is essential that adequate resources are available to provide ongoing professional development, adequate staffing, and appropriate structures and systems to support such a vision. Indeed, change is possible, but it needs to come with realistic expectations based on the constraints of the current resources and the top-down changes that need to be in place to support diversity in the classroom.

Another ongoing challenge that I see and that was made clearer through research and reading, is the challenge of supporting families that have children with EF challenges, particularly those with extensive, comprehensive support needs. Although this extends beyond the scope of this project or the responsibilities of schools and educators, it is clear that families are central to the care and development of children. Families that are facing difficult social, economic or other situations may already be managing extreme stress. They may not be in a
position to receive new information or implement new strategies. Supporting such families is a key societal challenge as this will have broad effects on the children from these families and on the other subsystems that interact with the family. Educators need to be aware of these challenges as it will impact their students as well as the form and expectations of family communication.

Looking ahead, I am excited about the changes to the curriculum in British Columbia Curriculum and the potential for integrating strategies and structures within the classroom that support EF while meeting and enhancing curricular content and competencies. I feel that there is willingness and desire within education to learn and adapt to the changing demands and demographics of our classrooms. Developing an understanding of executive functioning should be a natural part of this change as it will provide vital insight into the needs and challenges of students and universal strategies to implement within a diverse, inclusive setting.
References


doi:10.1006/cogp.1999.0734

doi:10.3389/fpsyg.2014.00388


Ward, S. (2019, October). The master class day one: Building executive function skills competency- Working memory, speed of processing and nonverbal learning [PDF


Appendix A

Executive Functioning Essentials Information Package
Executive Functioning Essentials

Information and Practical Strategies for Teachers, Families and Caregivers
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Executive Functioning

Handouts for Educators
Handout Overview

The following handouts are designed to be used in conjunction with the corresponding PowerPoint presentations. The content in the handouts aligns with the information in each section of the presentation. Additionally, the handouts are intended to be retained for future reference or to guide ongoing discussion and collaboration.

The first section provides an introduction and overview of executive functioning (EF). This is followed by sections on class-wide teaching strategies, supports and tools, and family/caregiver involvement. This information is covered in the initial presentation but the handouts have been titled separately for ease of use. The small group activity options section are provided and to be distributed and discussed within the context of small groups. The final three sections correspond with the last three sections of the PowerPoint presentation and provide more in-depth information about the EF components of inhibitory control, working memory and cognitive flexibility.
Executive Functioning Introduction

Executive Functioning: The brain-based, cognitive processes that help us to regulate our behavior, make decisions and set and achieve goals.

There are three main components of executive functioning:

1) Working Memory
   - Allows us to mentally hold and manipulate, manage and transform information
2) Inhibition
   - Control of behaviour, attention and emotion
3) Cognitive Flexibility
   - Allows us to change perspectives, shift priorities, respond to changing demands, apply different rules and think outside the box.

Executive functioning can also be thought of in terms of the skills that result from these components:
   - Response Inhibition
   - Working Memory
   - Emotional Control
   - Flexibility
   - Sustained Attention
   - Task Initiation
   - Planning
   - Organization
   - Time Management
   - Goal-Directed Persistence
   - Metacognition

Development of executive functioning skills is affected by both biology and environment. We are born with a genetic predisposition which is then shaped by the environment and our experiences both positive and negative.

Positive Influences:
   - Nurturing Relationships
   - Positive Social Experiences
   - Play
• Exercise
• Environments that provide scaffolding of the skills
• Gradual release of responsibility

Negative Influences:
• Lack of positive, nurturing relationships
• Neglect, abuse, violence and other sources of toxic stress disrupt brain development
• Lack of opportunities to use skills

Executive functioning challenges can be experienced by anyone. They are very common in individuals with ADHD, FASD, ASD, learning disabilities, and other developmental delays.

These can present multiple challenges at home and at school and require patience and support from others. Lack of executive functioning skills need to be viewed as a brain-based deficit and not as a reflection of character or will.

We can support students by implementing strategies and teaching that include:

1. Modifying the environment:
   • remove distractions
   • change expectations
   • change the requirements of a task
   • provide tools or support that remove the challenge (calculator, scribe, doing a task for a child that is too difficult etc.)

2. Structures and supports to compensate for challenges:
   • Written schedules
   • Visuals
   • Graphic organizers
   • Verbal or visual prompts
   • Lists

3. Interventions or programs to develop a skill:
• Curriculum that is designed to develop executive functioning (research on proven effectiveness only available for a few programs)
• Playing games that require executive functioning
• Providing opportunities to exercise the skill while providing scaffolding for success
Class-Wide Teaching, Supports and Tools for Executive Function

How can we support executive functioning in the classroom using class-wide strategies?

Tier One Supports to support lower level functions and develop higher level functions (available to all students):

- Posted schedules for the day, week, month
- Classroom routines for assigning and handing in homework, maintaining notebooks, desk and classroom, etc.
- Classroom and school rules and consequences for behaviour. Review and post rules that present challenge.
- Explicitly teach how to organize notebooks, how to keep a planner or calendar
- Explicitly teach how to take notes and how to study
- Use a variety of motivational strategies i.e. fun activity after hard effort, effective use of praise, First/Then
- Strategies to develop self-awareness and self-regulation skills (Alert program, Zones of regulation etc.)
- Visuals or other prompts to support inhibition (“Later Box, “What is my job card”, STOP visual, hand signals, touching student desk etc.)
- Encourage students to carefully read instructions and underline important words or repeat and explain instructions back
- “STOP and Read the Room” to support inhibition, problem solving, self-awareness, etc.
- Offer options for display of information (size, location, volume, font, etc.) to support working memory and other challenges
- Offer multiple ways of presenting the information (oral, written, videos, charts, hands on etc.) to provide for different types of learners
- Prompts and scaffolds to estimate effort, difficulty, resources (“Write on Clock”)
- Models and examples of process and product (“Get Ready, Do, Done” or “Goal, Plan, Do, Review, Refine”)
- Guides and checklists for scaffolding goal-setting
- Post goals, objectives and schedules in obvious place
- Appropriate goal setting through guidance and supports (UDL 6.1)
- Support planning and strategy development (UDL 6.2):
  - Embed “stop and think” and “show and explain your work”
  - Provide checklists and project planning templates
  - Model think alouds of the process
  - Guides for breaking long-term goals into several short-term goals
- Facilitate managing information and resources (UDL 6.3)
  - Graphic organizers, checklists, suggest systems
- Enhance capacity for monitoring progress (UDL 6.4)
  - Templates and questions to guide self-monitoring and self-reflection
  - Represent Progress using graphs, pictures of process
  - Provide multiple models of self-assessment strategies
  - Assessment checklists, scoring rubrics, examples of other student’s work with annotations so students can see work or performance examples

Specific Tools and Strategies (included in the Toolbox Handouts)

a) “Give Me Five”                          n) Tunnel Vision
b) Alert Scale                             o) Plan Your Route
c) Alternatives to Verbal Instructions     p) First/Then
  d) Future Glasses
  e) Future Goal Planning
  f) Later Box
  g) Speech/Thought Bubbles
  h) Get Ready, Do, Done
  i) What is my Job?
  j) STOP- Reorient and read the room
  k) Stop-Think-Do
  l) Sweep of Time
  m) Time Planning Worksheet
Family/Caregiver Involvement

Ecological Systems Theory: The child exists at the centre of many interworking systems and is most closely influenced by the microsystem which includes school, family and peers.

Why is family/caregiver involvement important?

- Research has shown:
  
  o Active family/parent involvement → Successful family/school partnerships → Positive long and short-term outcomes for children and families
  
  o One of the most effective ways to increase parent involvement is through enhanced family-school communication:
    ▪ Ongoing exchanges
    ▪ Supportive advice and material
    ▪ Available contact people
  
  o Consistently using executive functioning strategies across settings provides consistency and increases the opportunity for generalization of skills

*Always consider the needs, strengths, context, culture etc. of the school, families and community when deciding how to involve families, how to communicate most effectively, and which resources to provide.
Small Group Activity Options

Option #1:

1) How can you modify the physical space of your current classroom to support executive functioning?

2) How can you modify your classwide teaching strategies to support executive functioning?

3) What is one major assignment that you typically give to students in your class? How can you change the format of the assignment (for ALL students) to support executive functioning?

4) Make a plan to implement at least one change.

Option #2:

1) Select one component of executive functioning and read through the detailed handout as a group or in partners.

2) Choose one strategy or visual to support that component.

3) Discuss implementation in your classroom and practice using it in your group.

Option 3#:

1) This activity requires working with a partner or group that works with same or similar aged students.

2) Choose one curriculum area for your grade level and reference the curriculum for that subject area on the following website: https://curriculum.gov.bc.ca

3) What strategies do you currently use to explicitly teach the competencies for this subject area?
4) What strategies do you use to support the development of these competencies?

**Option #4**

1) How do you model methods for studying to your students?

2) What executive functioning skills are necessary for successful test preparation?

3) How can we explicitly teach test preparation and study skills to our students?

**Option #5**

1) Is it appropriate to share information or strategies for executive functioning support with the families and caregivers of your students?

2) How do you normally communicate with families?

3) How do you plan to communicate strategies with families to increase consistency across settings?

4) Which strategies might be helpful to share with families?

5) Would it be helpful to provide families with the parent brochure? Why or why not?

6) Considering your unique circumstances, are there other strategies that would be more appropriate to use to communicate with families?
**Inhibitory Control**

**Inhibitory Control:** Inhibitory control is the control of attention, behaviour, thoughts and/or emotions to override a strong internal desire or external lure. This is essential for staying on task, completing tasks, taking turns, waiting, and keeping focused on appropriate thoughts and ideas for the task. It is the opposite of impulsivity.

**Symptoms of Difficulty with Inhibitory Control:**
- Blurt out answers in class.
- Interrupting other people’s conversations.
- Daydreaming
- Getting in a fight or argument.
- Getting answers wrong on a test due to not reading the question properly.
- Asking irrelevant questions or making irrelevant or inappropriate comments.
- Easily distracted by other people or objects.

**Strategies to Support and Strengthen:**

1. Restructure the environment to decrease distractions and temptations i.e. Move student’s desk away from the source of distraction

2. Increase awareness of self through programs such as Zones of Regulation, Alert program

3. Explicitly teach rules and expectations for tasks or situations and review these prior to novel situations or when inhibitory control may be difficult.

4. Use appropriate visuals including
   a. First/ Then
   b. “What is my job?”
   c. STOP (re-orient and read the room)
   d. Stop, Think, Do

5. For a test or assignment, have students read questions out loud and underline directions before beginning task.

6. “Later Box” - When students are perseverating on an idea or thought or want to discuss an unrelated topic, mark a corner of the paper or place a sticky on the desk with the title “Later” and write words or draw picture to indicate and remind student that it will be discussed later. Point to the box when the child is off topic.

7. Tools for Self-Awareness
a. “Give me Five”: for awareness of self and awareness of our state of “alertness” (arousal). This can be used at many levels but can begin as a tool for self-awareness and then be used as we expand discussion of tools for regulation.

b. “Alert Scale”- we move up and down the scale throughout the day and different activities require different states

8. Monitor the student and be proactive if the child is showing a high arousal state or other early warning signs. If so, decrease inhibitory demands by decreasing the amount of time the child has to wait for a turn, offering an alternate activity, allowing movement, providing a break, etc.

**Things To Remember:**

1. Increasing the inhibitory load often decreases the capacity in other areas of executive functioning such as working memory.

2. Our goal, whenever possible is to move prompts, cues, etc. from: External ➔ Internal and to shift responsibility from: Adult ➔ Child
**Working Memory**

**Working Memory:** Working memory allows us to mentally hold, manage, manipulate and transform information.

**Examples of challenges:**

- Recalling letter sounds when decoding
- Slow retrieval of information
- Difficulty transcribing
- Poor spelling
- Math difficulty (mental math, estimation, problem solving, etc.)
- Difficulty remembering new information (vocabulary, facts, etc.)
- Forget what they were going to say
- Omit words in sentences, write short, simple sentences
- Difficulty following verbal instructions
- Lose belongings
- Difficulty getting started or staying on task
- Recalling what you just read and applying it to current task
- Remembering order of tasks or steps in assignment
- Difficulty taking notes

**Strategies to support:**

1. Reduce the Memory Load:
   - Chunk tasks
   - Reduce amount of work
   - Eliminate copy work
   - Provide written instructions and notes
   - Scribing, speech to text, word prediction
   - Calculator

2. Graphic Organizers:
   - Get Ready/Do/Done
   - Test Prep Sheet

3. Explicitly Teach “How” to do things:
   - How to underline key ideas and instructions, complete multi-step processes

4. Memory Aids:
   - Lists with pictures
   - Pictures of model desk, future self
   - Mnemonic devices
- Calendars, agendas
- visual of expectations for situations with pictures
- Formula sheets
- “cheat sheets”
- underline main ideas
- write down/ use device to document ideas as they are remembered
- alarms to remind of important meetings, deadlines
- There is likely an app that students could find to use to support them

5. Structured Work Systems:
  - Systems for handing in homework
  - System of organization for binders, notebooks
  - Explicitly teach how to organize and then label and take picture
  - Use of highlighters
  - Teach students how and what to study

6. Monitor/ Check in with Students:
  - Check in more frequently with student
  - More frequent, smaller due dates or mandatory check ins
  - Have students state back the instructions/ plan
  - Tap or point out the plan
  - “Future glasses” to picture self, visualize plan, anticipate emotion to increase motivation

External memory aids may continue to assist student for the long term, therefore:

External ⇔ Internal       Adult ➔ Child
- Calendars, agendas
- visual of expectations for situations with pictures
- Formula sheets
- “cheat sheets”
- underline main ideas
- write down/ use device to document ideas as they are remembered
- alarms to remind of important meetings, deadlines
- There is likely an app that students could find to use to support them

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External memory aids may continue to assist student for the long term, therefore:

External ⇔ Internal  
Adult ➔ Child
Cognitive Flexibility

Cognitive Flexibility: Cognitive flexibility involves the ability to shift flexibly in response to different demands or priorities and to see things from multiple perspectives both spatially and interpersonally. It appears later in development than inhibitory control and working memory.

Situations Requiring Cognitive Flexibility:

- Change of plans
- Unannounced event
- Unexpected problem
- Difference of opinion about a topic
- Stopping an activity to switch tasks
- Changes in the environment
- Changes in routine
- Trying a different solution to a problem (social, academic, etc.)
- Working as a group on a project
- Social interaction
- Critical analysis
- Developing insight into a story, situation, historical event
- Understanding another person’s motive

Strategies to Support Cognitive Flexibility:

1. Speech/ Thought bubbles
2. Comic strip conversations
3. Problem solving template
4. Graphic organizers
5. Tunnel vision tool/ gesture
6. Advance warning prior to change in routine or activity
7. Make small changes a normal part of the routine so that students learn how to manage changes in schedule
8. Visual schedule with “change” cards to add when a change is expected
9. Practice changes or flexible thinking in low stress situations
10. Model the thinking process of changing perspective by talking through the process out loud or pretending to not understand another perspective and then verbalize the thought process to develop flexible thinking.

11. Story telling where you have several possible endings.

12. Writing or speaking about a topic where you have to defend the opposite side of an argument.

13. Discuss history from many different perspectives.

14. Games that require cognitive flexibility
   Practice making a plan “b”

15. “Future glasses” where the student encounters a situation requiring flexible thinking.
Executive Functioning

Information for Families
Family Information Description

The information for families has been designed as a trifold, double sided brochure with an additional information sheet that can be folded and added inside the brochure, if desired. The manner in which this information is used or provided is at the discretion of the individual school or educator. This will be dependent upon many factors including the specific context, setting, needs, culture etc. of the community, school and classroom.
Laziness, Defiance or… Executive Functioning?

What causes executive function difficulties?

We aren’t born with executive skills, but we are born with the potential to develop them. They develop with age and continue to develop into adulthood. Other factors that may affect them include:

- Genetics/ Heredity
- Differences in brain structure due to medical conditions or injuries
- Differences in brain chemicals
- Early childhood experiences that caused stress or trauma

How can I help my child?

Continue doing activities that your child enjoys and that contribute to their overall social and emotional health (community involvement, cultural and traditional practices, family activities, sports, art, music, etc.)

Provide opportunities to practice skills through playing games, reading to them, imaginative play, conversation and allowing them to solve simple problems independently.

Make sure you have support.

Celebrate your child’s unique strengths!

Where can I find out more information and strategies to help my child?

Suggested Online Resources:
- www.understood.org
- Harvard Centre for the Developing Child- Executive Function Resources

Handout: “What can I do to help my school-age child?”

Other: School, Physician, Public Health Unit, local Family Resource Program
What are executive functions?

Executive functions are what allow us to manage our thoughts, behaviours and emotions so that we can make plans and get things done.

It involves 3 processes in our brain:

1) **Working Memory**: Holding and managing information.

2) **Inhibition**: Control of our thoughts, behaviours, attentions and emotions, even when tempted or distracted.

3) **Cognitive Flexibility**: Shift flexibly when the situation or task changes or when we need to see something from a different perspective.

Why are they important?

These 3 processes allow us to develop many important skills such as:

- Controlling our impulses
- Organizing
- Initiating tasks and staying focused on them
- Short term memory
- Paying attention
- Regulating emotions
- Planning and Prioritizing
- Self- monitoring (keeping track of what you are doing)
- Time Management

Busy airports need air traffic control systems, humans need executive functions.

Symptoms of Executive Functioning Challenges:

- misplacing papers or homework
- distracted easily
- difficulty with time management
- difficulty organizing schedules
- trouble keeping desk or bedroom organized
- constantly losing personal items
- difficulty dealing with frustration
- trouble following instructions
- trouble with memory recall or following multistep directions
What can I do to help my school-age child with executive functioning difficulties?

1) Activities that promote development of executive function:
   - Card games and board games that are challenging but fun to build skills such as memory, speed, emotional regulation, inhibition, perspective, decision making and problem solving.
   - Physical games that require decision making, self-control, problem solving, focused attention, perspective taking.
   - Conversation that involves back and forth dialogue.
   - Activities and relationships that have a positive effect on the child.
   - Cultural and religious practices and celebrations.
   - Music, singing and dance.
   - Puzzles and brainteasers.

2) Teach your child specific skills that they have difficulty developing on their own such as:
   - how to organize a space
   - how to study for a test
   - how to keep track of their belonging
   - how to plan time appropriately to be on time
   - how to break down a big task into smaller pieces
   - how to see things from a different perspective
   - how to approach a problem and come up with many possible solutions
   - how to write a list
   - how to manage homework
   - how to pack a bag
   - steps to get ready for school or an activity

3) Strategies to use to develop or support skills:
   - Lists and pictures to support the child to get ready, clean a space, pack a bag.
   - Teach them how to read time on an analog clock and always have an analog clock at home to refer to. Mark out time segments on the clock so they can understand what can be reasonably accomplished.
   - Help them figure out ways to break down a task.
   - Ask simple questions to encourage the child to have to think instead of telling them what to do i.e. “What is your job right now?” vs. “Put on your coat and shoes.”
   - Show them how to use a calendar to keep track of events
   - Model problem solving by talking out loud when you are figuring something out.
   - Teach them about what other people might be thinking instead of assuming that they know.
   - Allow extra time for them to finish difficult tasks.
   - Teach specific systems for organizing and remembering.
   - Teach them how to use external systems such as timers, written reminders, calendars, lists, etc. but then gradually give them the responsibility to use these systems. This may take years to develop.
   - Model how to recognize when you are getting upset or angry so that they can learn to recognize it in themselves.
   - Model positive ways to calm down and manage emotions.

*There are many specific tools and strategies to further support these areas. Reach out for help from professionals, other parents, support groups, books and online resources to learn more.

Designed by: Sarah Beselt
Executive Functioning Toolbox
Toolbox Description

The toolbox consists of multiple tools, strategies and visuals. These can be used in a class-wide, one-to-one, home or community settings. They can be used by parents, teachers, educational staff or any other individuals that are involved in the care and support of a student or group of students. Using these tools across multiple settings allows for consistency of language and methods and increases the opportunity for the generalization of skills in various contexts.
“Give me 5” and “Alert Scale”

How to Use:

These can both be used as a check-in before, during or after activities or to begin teaching about executive functioning and regulation. The purpose of these tools is to develop self-awareness and to determine if your body is in the right state for the demands of the activity or task. Different tasks require different arousal levels. These tools can help with basic self-regulation as well as with awareness of how different levels of arousal affect our executive functioning skills.

As with all of the tools, they can be used flexibly across a variety of settings and in conjunction with other tools.

Using a visual gives external support and a systematic breakdown of the concept. Gradually fade the verbal and visual aspect of the tool and move toward use of gesture when appropriate (such as holding up 5 fingers or other pre-determined gesture).
Give Me 5

- EYES
- EARS
- MOUTH
- HANDS
- BODY
Alert Scale

zz

bed
turtle
smiley
people
fireworks
Alternatives to Verbal Instructions

1) A list with words and pictures.

2) A picture of what “done” would look like so the child can decide on steps to achieve the desired outcome.

3) A picture of “done” accompanied by a list (with or without pictures).

4) Give verbal instructions with actions for each step. Have the child repeat the actions and words back. If desired, the steps can be written down after the actions have been repeated (do not write the list prior to the actions)

5) Create a mnemonic to accompany the steps.

6) Develop a song or jingle to accompany the steps.

7) Use items to represent each step.

8) Chunk long sets of instructions into manageable stages.

9) Partner students together to work as a team to complete tasks.

10) Give students the chance to imagine themselves doing the actions and “point out” plan for completing.

Note: Consider the developmental level of the child and keep expectations appropriate and achievable. Begin with one or two items and only add when the child has demonstrated success.
Future Glasses

How to use (suggested strategies):

1) **Option One- Planning the “do”:** Have the student put on a pair of glasses (their “future glasses”) to create a mental image of themselves in the future. Using this future image, have the student determine what they will need to do to achieve the future image.

2) **Option Two- Planning the route:** Have student put on a pair of glasses and picture the tasks that they need to complete in a specific future period of time. Have them tell you how they see themselves moving through physical space and the route they plan to take to complete the tasks.

3) **Option Three- Emotions as a motivation:** Have the student put on the future glasses and imagine themselves in the future. Have them imagine the positive emotion they will have when they accomplish a specific task. Conversely, what negative emotion would accompany a different outcome?

4) **Option Four- use it flexibly and fade the prompt/ visual:** As always, fade the visual or prompt with time and use a gesture etc. instead of glasses. Use the tool across any setting and in combination with other tools.
Future Goal Planning

Goal

Future Picture

Obstacles

Time

Plan

Do

Review
“LATER BOX” STRATEGY

How to use:

1) When students are perseverating on an idea or thought or want to discuss an unrelated topic, mark a corner of the paper or place a sticky on the desk with the title “Later” and write words or draw picture to indicate and remind student that it will be discussed later. Point to the box when the child is off topic rather than verbally reminding them.

2) Teach the student to use a later box to write down ideas that they want to share. This can help students that are afraid of forgetting an idea, have working memory challenges, have trouble inhibiting and those that need a replacement for interrupting at inappropriate times.
Speech/ Thought Bubbles

How to use:

1) To teach perspective- Other people might have different thoughts than we do.
   a) “What were you thinking when ______ happened?”
      (Draw in thought bubble above person ‘a’)
      “What do you think your friend was thinking when ______ happened?”
      (Draw a thought bubble above person ‘b’)
   b) “When you said__________, what were you thinking?”
      (Draw in thought and speech bubble above person ‘a’)
      “What do you think your friend was thinking when you said__________?”
      (Draw in thought bubble above friend)

2) To teach that we can have thoughts and not need to say them.
   a) “When you are sitting in a room and no one is speaking, what are people thinking about?”
      (Draw simple drawing with multiple thought bubbles above heads)
   b) “Can you have a thought and hold it in your head without saying it?”
      (Draw person with thought bubble and then draw a crossed out speech bubble)
      Ask child: “When might we have thoughts and not say anything?
      Ask child: “What else can we do if we want to speak or are afraid of forgetting the idea?” (Draw picture or alternate activity or of person writing idea on a paper)
Using the “Get Ready, Do, Done” Strategy

How to use:

1. Show students how we start by asking the question: “What will ‘Done’ look like?”
   - If they are not able to imagine a future picture, either provide them with a sample or do a sketch/mock example of “Done”.

2. Next ask “What steps will I need to take to get there?”
   - Ask questions to prompt thinking, give them hints, or use choice questions instead of telling them the answer.
   - Write these in the “Do” box.

3. Then ask “What materials and supplies will I need?”
   - Ask questions to prompt thinking, give them hints, or use choice questions instead of telling them the answer.
   - Write these in the “Get Ready” box.

4. Show students that the final step is “Get Done” where we clean up our supplies, put away or hand in our work, etc.

When teaching this, you will need to model it several times using a simple, concrete product. Gradually, release responsibility and increase the complexity of the task.
“What Is My Job?” and “STOP” Strategy and Tool

How to use:

“What is my job?” Visual/ Question/ Gesture

This can be used as 1) a verbal question (“What is your job right now? ) 2) a printed visual 3) a gesture OR any combination of 1, 2 and 3. Fade the prompt from verbal to visual to gesture so as to not over-prompt but allow the child to build skills and tools. This can be used to re-orient or re-direct when off task or distracted or to read the room when entering the space.

“STOP” Visual/ Question/ Gesture

It can be followed by using the STOP visual and prompt with the specific steps of Space, Time, Objects and People. Fade the prompt from verbal to visual to gesture so as to not over-prompt but allow the child to build skills and tools. This can be used to re-orient or re-direct when off task or distracted or to read the room when entering the space.

What is my job

S: Space
1. Where am I?

T: Time
1. What time is it?
2. What subject is it?

O: Objects
3. What objects are being used?
4. What objects do I need?

P: People
5. Who is here?
6. What are other people doing?
What is my job
S: Space
   - Where am I?

T: Time
   - What time is it?
   - What subject is it?

O: Objects
   - What objects are being used?
   - What objects do I need?

P: People
   - Who is here?
   - What are other people doing?
STOP
- Take a deep breath
- Count to 10

THINK
- What are my choices?

DO
Sweep of Time to Increase Time Awareness

Option One (Single Task):
1. Gather necessary supplies:
   - “Working” analog clock
   - Dry erase marker
2. Using a familiar task as an example (eat lunch, go to the bathroom, pack their school bag, complete an assignment) have the student/child estimate how long they expect the task to take.
3. Using a dry erase marker, mark the time span on a clock by filling in the section of the clock that it will take (remember: colour from centre to outside edge in strokes that follow the direction of the moving minute hand).
4. Have the child complete the task without prompting.
5. Discuss if estimate was accurate and plan for next time.

Option Two (Two or Three Consecutive Tasks):
1. Gather necessary supplies:
   - “Working” analog clock
   - Dry erase markers (several colours)
2. Using tasks familiar to the student that typically follow a sequence or that has multiple steps (Morning routine, page of math with several sections, reading a story or specific passage followed by comprehension questions, a written assignment that has more than one component such as an outline, story and a picture) brainstorm, write, draw picture.
3. Using dry erase markers, mark the time spans on a clock using different colours. (remember: colour from centre to outside edge in strokes that follow the direction of the moving minute hand).
4. Debrief.

Option Three:

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1. Use the Get Ready, Do, Done model to break down an assignment or to any other multi step activity.
2. Estimate how long each portion will take.
3. Mark the sections on the clock (use the same colours as used in GR/Do/Done)
4. If the task is long or multi component, mark the rim of the clock with magnets to indicate sections or half-way mark.
5. Debrief following activity.
6. Have student state what they would do differently next time.

Option Four:
- Use the clock flexibly or informally in different situations with students that are familiar with the concept. Check in periodically or problem solve when needed.
### Time Planning Worksheet

<table>
<thead>
<tr>
<th></th>
<th>Planning Notes</th>
<th>Time Estimation</th>
<th>Actual Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Where am I going?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How am I getting there (walking, driving, biking etc.)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How long does it usually take to get there?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What factors might increase the time to get there (weather, traffic, construction, stops along the way, getting gas, parking, bad directions)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Am I planning to stop along the way?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>So, what time do I need to leave the house by?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What do I need to do before I go?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What materials do I need to gather?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What time do I need to start getting ready</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tunnel Vision

A tunnel vision analogy can be used to explain how tunnel vision only lets us see our own perspective and our own point of view.

Activity idea:
1. Have students hold up a paper towel roll or rolled up piece of paper. Have the students take turns describing what they see.
2. Ask questions while they have their tunnel vision in place such as “Are different people wrong because we see different things?” “What can we learn from listening to others?”
3. Remove the tunnel vision. Ask students how things look when we see without tunnel vision?
4. What can we do when we are only able to see one perspective?

Hand Gesture:
You can use the gesture or holding up your hand to your eye as a way to show that a student may be seeing a situation with tunnel vision or when you notice an example of tunnel vision in a book, story, history lesson etc. Do not use this as a form or reprimand or when the student is already in a high arousal state.
Plan Your Route: Walk It Out, Map It Out, Tap It Out, Point It Out

How to use:
This can be used for several reasons. It can be used for students with inhibitory challenges that become distracted while completing a task, for students that struggle with future planning and breaking down a task into steps, to anticipate emotion and make a plan to manage the emotion, to develop spatial awareness, to develop awareness of possible obstacles etc. It begins in a very concrete way by and slowly fades the prompt and the responsibility to the student.

Step One- Walk It Out:
This step involves walking out the route to create awareness, motor memory, to anticipate emotion, and to practice the route in a low arousal state without the pressure of having to complete the actual task.

Step Two- Map It Out:
Create a map and mark the intended route on the map. Assess if the chosen route is the most efficient route. You may want to identify any possible obstacles or sources of distraction and make a plan of how to manage.

Step Three- Tap It Out:
Tap out the route on the map that you have created using a pointer.
Step Four- Point It Out:
Have the student tell you their intended route and point in the general direction where they are planning to go. This helps to visualize and create a mental dress rehearsal of the future event.
First/ Then Visual

This tool is designed to be used to increase motivation and independence, create predictability and structure, clarify expectations, provide an alternative to verbal prompting, build up to more complex tasks and sequencing, and to assist in transitioning of activities. The non-preferred and/or initial task is presented in the “first” box using a drawing or image and, possibly, a word description. The preferred and/or secondary task is placed in the “then” box. The use of this tool will be dependent upon the needs and preferences of the child or the demands of the situation.
Problem Solving

What is the problem?

What are possible solutions?

Option 1:

Option 2:

Option 3:

Option 4:

Was the problem solved or was an acceptable solution found?

Yes? Great!

No? Try Another Option
Appendix B

PowerPoint Presentation (With Presenter Notes)
Executive Functioning
There are many challenges faced by students and educators in the classroom. These include lost homework, messy desks, talking instead of doing work, disorganized homework, poor spelling etc.
What is the cause of these challenges? Is it due to laziness, defiance, poor attitude or possibly .... Executive functioning challenges?
Executive functioning is the term to describe the brain-based, cognitive processes that help us to regulate our behaviour, make decisions and set and achieve goals.
Executive functioning is essentially the brain’s air traffic control system.
There are three main components of executive functioning.
1) Inhibitory Control
2) Working Memory
3) Cognitive Flexibility
Inhibitory Control:
Control of behaviour, attention, thoughts and/or emotions
Working Memory:
Allows us to mentally hold and manipulate, manage and transform information
Cognitive Flexibility:
Allows us to change perspectives, shift priorities, respond to changing demands, apply different rules and think outside the box.
This diagram shows how the three components work together and develop higher level executive functions such as reasoning, problem solving and planning.
Executive functioning can also be thought of in terms of the skills that result from these components:

- Response Inhibition
- Working Memory
- Emotional Control
- Flexibility
- Sustained Attention
- Task Initiation
- Planning/Prioritizing
- Organization
- Time Management
- Goal-Directed Persistence
- Metacognition
• Goal-Directed Persistence
• Metacognition
Development of executive functioning skills is affected by both biology and environment. We are born with a genetic predisposition which is then shaped by the environment and our experiences both positive and negative.

Positive Influences:
• Nurturing Relationships
• Positive Social Experiences
• Play
• Exercise
• Environments that provide scaffolding of the skills
• Gradual release of responsibility

Negative Influences:
• Lack of positive, nurturing relationships
• Neglect, abuse, violence and other sources of toxic stress disrupt brain development
• Lack of opportunities to use skills

Executive functioning challenges can be experienced by anyone. They are very common in individuals with ADHD, FASD, ASD, learning disabilities, and other developmental delays.
In groups of 3-4, consider these small group discussion questions.

- What are common executive functioning challenges for the students you work with?
- How do these challenges impact their behaviours?
- How do these challenges impact their learning?
Why is it important for educators to understand executive functioning?

Reason One:

• 21st Century capabilities require high levels of executive functioning
Reason #2
• Key predictor of future health, wellbeing and success in work and life
Reason #3
• EF skills are part of the BCs new curriculum
• The curriculum is comprised of
  • Content
  • Competencies
  • Big Ideas
Executive Functioning skills are required for students to develop and achieve the core and curricular competencies.
How can we support our students?
### Three Options for Supporting Students:

- Modify the environment
- Use structures and supports
- Interventions or programs

Three options for supporting students:

1) **Interventions or programs**
   - Curriculum that is designed to develop executive functioning (research on proven effectiveness only available for a few programs)
   - Playing games that require executive functioning
   - Providing opportunities to exercise the skill while providing scaffolding for success
1) Modify the environment
   • remove distractions
   • change expectations
   • change the requirements of a task
   • provide tools or support that remove the challenge (calculator, scribe, doing a task for a child that is too difficult etc.)
1) Use structures and supports
   • Written schedules
   • Visuals
   • Graphic organizers
   • Verbal or visual prompts
   • Lists (consider using an icon as well to access non-verbal working memory)
   • Calculators, computers, voice recognition
   • Word banks
   • Provide a printed copy of instructions or information at the student’s desk
   • What other supports can you use?
Educators should consider implementing the Universal Design For Learning (UDL) as a means of creating structures and supports for several reasons:

- Specifically addresses EF
- Embeds principles and practices to support EF
- Supports BC Curriculum

Further detailed information and links available on the BC Ministry of Education website. Several initiatives have been undertaken to support the implementation of the framework in BC schools.
Ask the question:
• What is being done or has been done in your school or district to implement the UDL framework?
Interventions or Programs Specifically Designed to Develop a Skill:

- There are several programs designed to develop executive functioning skills
  
  **NOTE:** There are only a few programs that have been researched and proven effective
- Play games that require executive functioning skills
- Provide opportunities to exercise the skill while providing scaffolding for success
Refer to the handout titled Class-Wide Teaching, supports and Tools for Executive Function

As a large group, brainstorm and share
1) What else can be done that is not listed?
2) What class-wide tier one supports do you use in your classroom?
This diagram is based on **Ecological Systems Theory**.

- The child is exists at the centre of many interworking systems and is most closely influenced by the microsystem which includes school, family and peers.
Why is family/caregiver involvement important?
Research has shown:

- Active family/parent involvement → Successful family/school partnerships → Positive long and short-term outcomes for children and families

- One of the most effective ways to increase parent involvement is through enhanced family-school communication:
  - Ongoing exchanges
  - Supportive advice and material
Available contact people

• Consistently using executive functioning strategies across settings provides consistency and increases the opportunity for generalization of skills

Always consider the needs, strengths, context, culture etc. of the school, families and community when deciding how to involve families, how to communicate most effectively, and which resources to provide.
This brochure for families/ caregivers may be a helpful tool to support communication. Consider the best way of providing this brochure. Should it be provided as part of a class newsletter? At parent- teacher interviews? Is there a better method of communicating the information and ideas with the families at your school?
Important considerations when we partner and communicate with families:

• Needs
• Strengths
• Context
• Culture
All participants at this presentation can be provided with these handouts:

1) Handouts on executive functioning and the components of inhibitory control, working memory and cognitive flexibility

2) “Toolbox” for visuals, strategies and tools

3) Family Information Brochure
Inhibitory Control
Dream...

The dream classroom....
Reality?

Daydreaming  Texting  Talking

Realistic classroom?
**Inhibitory Control**: Inhibitory control is the control of attention, behaviour, thoughts and/or emotions to override a strong internal desire or external lure. This is essential for staying on task, completing tasks, taking turns, waiting, and keeping focussed on appropriate thoughts and ideas for the task. It is the opposite of impulsivity.
Symptoms of Difficulty with Inhibitory Control:
• Blurting out answers in class.
• Interrupting other people’s conversations.
• Daydreaming
• Getting in a fight or argument.
• Getting answers wrong on a test due to not reading the question properly.
• Asking irrelevant questions or making irrelevant or inappropriate comments.
• Easily distracted by other people or objects.
Strategies to Support and Strengthen:

• Restructure the environment to decrease distractions or temptations i.e. Move student’s desk away from the source of distraction

• Increase awareness of self through programs such as Zones of Regulation or Alert program

• Explicitly teach rules and expectations and review prior to novel situations

• Use appropriate visuals such as
  ▶ First/Then
  ▶ “What is my job?”
  ▶ STOP (re-orient and read the room)
  ▶ Stop, Think, Do

• Have students read questions out loud on tests and assignments
• Use appropriate visuals including
  • First/ Then
  • “What is my job?”
  • STOP (re-orient and read the room)
  • Stop, Think, Do

• For a test or assignment, have students read questions out loud and underline directions before beginning task.
“Later Box”- When students are perseverating on an idea or thought or want to discuss an unrelated topic, mark a corner of the paper or place a sticky on the desk with the title “Later” and write words or draw picture to indicate and remind student that it will be discussed later. Point to the box when the child is off topic.

• Tools for Self-Awareness

• “Give me Five”: for awareness of self and awareness of our state of “alertness” (arousal). This can be used
at many levels but can begin as a tool for self-awareness and then be used as we expand discussion of tools for regulation.

• “Alert Scale”- we move up and down the scale throughout the day and different activities require different states

• Monitor the student and be proactive if the child is showing a high arousal state or other early warning signs. If so, decrease inhibitory demands by decreasing the amount of time the child has to wait for a turn, offering an alternate activity, allowing movement, providing a break, etc.
Our goal, whenever possible is to move prompts, cues, etc. from: External ➔ Internal

And to shift responsibility from: Adult ➔ Child
Increasing the inhibitory load often decreases the capacity in other areas of executive functioning such as working memory.
Working Memory
Which of the following relies heavily on working memory?

a) Learning to read phonetically
b) Writing down information given orally
c) Using correct spelling
d) Solving word problems in math
e) All of the above
Working Memory: Working memory allows us to mentally hold, manage, manipulate and transform information.
Examples of challenges:

- Recalling letter sounds when decoding
- Slow retrieval of information
- Difficulty transcribing
- Poor spelling
- Math difficulty (mental math, estimation, problem solving, etc.)
- Difficulty remembering new information (vocabulary, facts, etc.)
- Forget what they were going to say
- Omit words in sentences, write short, simple sentences
• Difficulty following verbal instructions
• Lose belongings
• Difficulty getting started or staying on task
• Recalling what you just read and applying it to current task
• Remembering order of tasks or steps in assignment
• Difficulty taking notes
Strategies to support:

Reduce the Memory Load:
- Chunk tasks
- Reduce amount of work
- Reduce or eliminate copy work
- Provide a copy of written instructions and notes
- Scribing, speech to text, word prediction
- Calculator
Graphic Organizers:
- Get Ready/Do/Done
- Test Prep Sheet

Explicitly Teach “How” to do things:
- How to underline key ideas and instructions, complete multi-step processes
- Teach how to study and to create study tools
Memory Aids:

- Lists with pictures
- Pictures of a model desk or future self
- Mnemonic devices
- Calendars, agendas
- Visual of expectations for a situation with pictures
- Formula sheets
- "cheat sheets"
- Write down/document ideas to remember and decrease interrupting
- Alarms to remind of important meetings, deadlines
- Apps

Strategies to Support and Strengthen

- Lists with pictures
- Pictures of model desk, future self
- Mnemonic devices
- Calendars, agendas
- Visual of expectations for situations with pictures
- Formula sheets
- "cheat sheets"
- Underline main ideas
- Write down/use device to document ideas as they are
remembered
• alarms to remind of important meetings, deadlines
• there is likely an app that students could find to use to support them
Alternatives or supports for verbal instructions:
- List with words and pictures
- Picture of “done” with a list “to do”
- Use actions to accompany steps in instructions- this helps access different parts of the brain
- Mnemonic
- Items to represent each step
- Chunk long instructions
- Partner students
"Blurting" or interrupting in class (Working Memory and Inhibition):
• Must write down idea before putting up hand
• "Rules" of how many times each student can share
• Explicitly explain the purpose of class discussion
• Students that continue to interrupt may require Tier 2 support

Time Management/Awareness
• Analog clock
• Write on clock
• Make time physical, visible, tangible
• Future glasses
• Break down large assignments or studying into chunks and write it on a calendar
chunks and write it on a calendar
External memory aids may continue to assist student for the long term, therefore:

External ↔ Internal
Adult → Child
Cognitive Flexibility
Warm up question:

Which children’s book features a character that struggles with cognitive flexibility?

- a) Berenstain Bears
- b) Charlie and the Chocolate Factory
- c) The Lion the Witch and the Wardrobe
- d) Scaredy Squirrel
- e) Harold and the Purple Crayon
Cognitive Flexibility: Cognitive flexibility involves the ability to shift flexibly in response to different demands or priorities and to see things from multiple perspectives both spatially and interpersonally. It appears later in development than inhibitory control and working memory.
Situations Requiring Cognitive Flexibility:

- Change of plans
- Unannounced event
- Unexpected problem
- Difference of opinion about a topic
- Stopping an activity to switch tasks
- Changes in the environment
- Changes in routine
- Trying a different solution to a problem (social, academic, etc.)
- Working as a group on a project
• Social interaction
• Critical analysis
• Developing insight into a story, situation, historical event
• Understanding another person’s motive
Strategies to Support Cognitive Flexibility:

- Speech/ Thought bubbles
- Comic strip conversations
- Problem solving template
- Graphic organizers
- Tunnel vision tool
- Advance warning
- Practice in low stress situations
- Model thinking process of perspective taking
- Stories with multiple endings
- Have to defend an opposing opinion (debate, essay)
- History from multiple perspectives
- Games
- Future glasses to anticipated situation

• Make small changes a normal part of the routine so that students learn how to manage changes in schedule
• Visual schedule with “change” cards to add when a
change is expected

• Practice changes or flexible thinking in low stress situations
• Model the thinking process of changing perspective by talking through the process out loud or pretending to not understand another perspective and then verbalize the thought process to develop flexible thinking
• Story telling where you have several possible endings
• Writing or speaking about a topic where you have to defend the opposite side of an argument
• Discuss history from many different perspectives
• Games that require cognitive flexibility
• Practice making a plan “b”
• “Future glasses” where the student encounters a situation requiring flexible thinking