Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

03-Apr-2017

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English - Or. English

DIRECTORATE FOR EDUCATION AND SKILLS
EDUCATION POLICY COMMITTEE

PRELIMINARY REFLECTIONS AND RESEARCH ON KNOWLEDGE, SKILLS, ATTITUDES AND VALUES NECESSARY FOR 2030

The Future of Education and Skills: Education 2030

9-10 November 2016
Beijing, China

The following experts have contributed to the following sections of this paper:
- Section I: Reflections on the knowledge domain by Professor Michael Young (UCL Institute of Education).
- Section II: Preliminary construct analysis in the skills domain by Dr Katherine Ross (University of Virginia, Curry School of Education), Dr Philip Tomporowski (University of Georgia), Dr Anita Collins (University of Canberra), Dr Rachael Jacobs (Australian Catholic University) and Dr Stephen Billett (Griffith University).
- Section III: Preliminary construct analysis in the attitudes and values domain by Laura Lippman, Sr. Technical Advisor, FHI360.
- Section IV: Preliminary construct analysis focusing on malleability by Professor Kimberly A. Schonert-Reichl (The University of British Columbia).

The IWG participants are invited to:
- NOTE the experts \papers in this document so as to COMMENT on the key constructs suggested in the progress report [EDU/EDPC(2016)23] to be discussed during the Item 2a and 2b of the 4th meeting of the Informal Working Group.
The document has been revised based on the comments made at the 4th IWG meeting in November 2016.

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JT03411835

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PRELIMINARY REFLECTIONS AND RESEARCH ON KNOWLEDGE, SKILLS, ATTITUDES AND VALUES NECESSARY FOR 2030

Background

1.   In the discussion of the framework development towards the DeSeCo 2.0 at the 3rd meeting, the Informal Working Group (IWG) welcomed the first layer of abstraction, i.e. taxonomy of "knowledge", "skills", and "attitudes and values". To further the framework at the second layer (i.e. sub-domains, such as "cognitive & metacognitive", "social & emotional", and "practical and physical" for the skills domain) as well as to be more concrete about the third layer (i.e. constructs, such as "critical thinking", "creative thinking", "self-control", "empathy", etc.), the secretariat commissioned expert papers.

2.   The experts were asked to review research or synthesis of research that supports the key constructs in line with the 4 guiding principles "relevance for 2030", "impactful", "malleable", and "measurable" agreed by the IWG. The principle concerning "relevance for 2030" will be further specified after the discussion at the 4th IWG meeting.

3.   This paper includes the following drafts:

- **Section I: Reflections on the knowledge domain** by Professor Michael Young (UCL Institute of Education)

- **Section II: Preliminary construct analysis in the skills domain** by Dr. Katherine Ross, (University of Virginia, Curry School of Education), Laura Lippman (FHI360), Dr. Philip Tomporowski (University of Georgia), Dr Anita Collins (University of Canberra), Dr Rachael Jacobs (Australian Catholic University) and Dr. Stephen Billett (Griffith University).

- Section III: Preliminary construct analysis in the attitudes and values domain by Laura Lippman (FHI360).

- **Section IV: Preliminary construct analysis focusing on malleability** by Professor Kimberly A. Schonert-Reichl (The University of British Columbia)

4.   The IWG participants are invited to NOTE the experts' papers in this document so as to **COMMENT on the key constructs suggested in the progress report [EDU/EDPC(2016)23]** to be discussed during the **Item 2a and 2b** of the 4th meeting of the Informal Working Group.

- **Relevant** - likely to help people live successfully and shape the world in 2030 to be resilient, innovative and sustainable (i.e. that are most relevant for "creating new values", "taking responsibility", and "dealing with tensions, dilemmas, tradeoffs")

- **Impactful** - proven (or thought capable of being proven) to have a significant bearing on their future life outcomes

- **Malleable** - can be developed through the processes of learning proven) to have a significant bearing on their future life outcomes

- **Measurable** - can be given (or thought capable of being given) a comparative numerical value on a scale, or in other means.

5.   The draft will be finalised by the experts, based on the discussions at the 4th IWG meeting.

Section 1: Reflection on the Knowledge Domain: School Curriculum in 2030

1.1   Introduction

6.   This Position Paper builds on a paper I wrote with my colleague Johan Muller (Young and Muller 2010) in which we described three scenarios for a 'curriculum of the future', each based on a different concept of knowledge. Our paper was written seven years ago but nothing in the intervening period has suggested that the question of knowledge which we emphasised has become a less salient issue for curriculum designers, or that it will not become an issue of even greater salience by the year 2030.

7.   Our 2010 paper was written from what we referred to as a 'social realist' perspective which will also inform this paper. What 'social realist' means here is that although it recognizes that knowledge is social in origin that does not mean that all knowledge is of equal worth; there is knowledge that has an intrinsic objectivity. We make a distinction between 'knowledge of the powerful' when the power of knowledge is inherent in who the knowers are- a notion akin to Marx's concept of ideology- and 'powerful knowledge' which refers to the characteristics of knowledge itself and how it is produced within specialist communities with shared rules and norms. Powerful knowledge is most closely represented in the academic disciplines with their specialized ways of understanding the world, and their self-correcting rules which have the purpose of 'truth seeking' (or refuting conjectures in Popper's terms) . As such it is more reliable, and more powerful in its capacity for generalization in the sciences and in its scope for imagining alternatives in the models and texts of the humanities. Thus powerful knowledge is not powerful simply because of who possesses it but because the 'truth-seeking' methods through which it is produced allows it to progress in ways that are not dependent on its origins.

8.   Following an elaboration of the concept of 'powerful knowledge I will outline of what I see its implications for curriculum designers and the future of curricula. The paper will conclude by presenting my reflections on this approach to the curriculum and its limitations.

1.2   The concept of powerful knowledge: as a curriculum principle

9.   The starting point for the idea of 'powerful knowledge' is that there is *better* knowledge, more reliable knowledge, knowledge nearer to being true about the world we live in and it is this knowledge that is the main purpose of the school to enable pupils to engage with and acquire. At the same time, this knowledge is not fixed or given; it is always fallible and open to challenge. The difficulty this epistemological claim poses is how to hold these two ideas—'there is the better knowledge' and 'this knowledge is fallible' together. Fallibility does not mean 'anything goes' but that in any specialist knowledge community, there are rules and concepts which always leave open some questions which become the basis of new knowledge. This means that in order to experience the fallibility of knowledge, you have to be part of or engaged with the community in question. The natural sciences and the social sciences and humanities pose contrasting difficulties in this regard. At the school and even at the undergraduate level, students of the natural sciences have to take the idea of fallibility 'on trust'; they are unlikely to have progressed sufficiently in mathematics to make the idea of knowledge being 'fallible' real to them, unless they have studied statistics when they would have been introduced to the idea of

'probability. The problem for students in the humanities and social sciences where mathematics plays at best a more limited role and the boundaries between subject and everyday knowledge are weaker is that there is often little agreement among specialists about what the rules and concepts of a discipline are. However, even in such fields, there is likely to be a degree of agreement on the range of concepts that all members of the particular specialist community would recognize as open to debate within the discipline, and hence fallible. It is this knowledge that I refer to as 'powerful knowledge'.

10.   Powerful knowledge has two key characteristics and both are expressed in the form of boundaries.

- It is specialized, in how it is produced (in workshops, seminars and in laboratories) and in how and where it is transmitted (in schools, colleges and universities) and this specialization is expressed in the boundaries between disciplines and subjects which define their focus and objects of study. In other words, powerful knowledge is not *general* knowledge. This does not mean that boundaries are fixed and not changeable. However, it does mean that cross-disciplinary research and curricula depend on discipline-based knowledge to provide the sense of identity and continuity for learners and researchers and therefore, that inter-disciplinary curricula are unlikely to be appropriate for learners who have not had access to the relevant disciplines.

- It is *differentiated* from the experiences that pupils bring to school or older learners bring to college or university. This differentiation is expressed in the conceptual differences between school and everyday knowledge. Whereas the concepts of everyday knowledge are tied to particular contexts for their meaning, the concepts of subject-based school knowledge are related to each other and have meanings shared within the different communities of specialists.

- These characteristics of 'powerful knowledge' are not restricted to what are referred to as STEM (science, technology, engineering and mathematics) disciplines and subjects, although STEM disciplines and subjects express the features of powerful knowledge least ambiguously.

- Two final points. It has been argued that powerful knowledge is discipline-based and has the generalising capacities of disciplines, strong in the case of the natural sciences and weaker in the social sciences; furthermore the meaning of generalisation in the humanities like literature is very different from its meaning in physics[1], whereas both are distinguished from everyday knowledge by not being tied to particular contexts. It is for these reasons that Muller and I ((2016) have argued that the concept of 'powerful knowledge' can be used as a curriculum principle as well as a sociological concept for analysing different curricula.

1.3   Some key curriculum issues

11.   The popularity of E D Hirsch's[2] core knowledge thesis (Hirsch 1988) by some in the USA, and by the UK Coalition Government in their 'return to subjects' approach to the revised National Curriculum (Young 2011;Young and Muller 2016) and the increasing importance given by governments to STEM subjects (Muller and Young 2016) are indications that access to specialised knowledge is becoming a key issue at least for some curriculum designers. This is for a number of reasons.

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[1] In his new book, **Reality is not what it seems**(Allen and Lane 2016), the Italian theoretical physicist, Carlo Rovelli emphasizes the differences as well as the similarities between Dante's visions of the universe in the Divine Comedy and Einstein's General Theory of Relativity.

[2] Hirsch was invited to give a series of lectures in England in 2015 by the Policy Exchange, a Think Tank founded by Michael Gove, the Secretary of State for Education at the time.

12.   The first issue is that specialisation is closely associated with new knowledge which is being produced at an increasing rate. This poses new challenges for curriculum designers in relation to the question of content selection. Two typical strategies can be identified that I refer to as **genericism** and **generalisation**. The former makes the assumption that there are common processes underlying the development of knowledge in all disciplines that can be identified and used to inform content selection. In contrast the latter argues that there are no such common processes and knowledge progresses differently in different disciplines. It follows that whereas a generic approach offers governments a way of controlling the development of the curriculum but at the price of weakening its capacity to generalise, an approach committed to developing a theory of knowledge generalisation favours truth over control of the curriculum.

13.   The second challenge raised by the growth and specialisation of knowledge is the issue of access and increasing participation. This is a social justice issue and also arises out of changes in the organisation of work, as more and more skilled and even middle-level work such as translation and computing can now be done by machines. Again we can contrast two strategies directed to the issue of social justice which have parallels with the the genericism/generalisation distinction. Both focus on access. However, the first treats **access** in terms of extending participation in formal education. The case of the Brazilian *'bolsa familia'* where parents receive an income supplement on condition that they ensure that their children attend school is an example. However it does not provide a basis for evaluating 'what' pupils gain access to in staying longer at school. The second explicitly curricular approach interprets access in terms of what knowledge pupils whose participation in school is extended gain access to.

14.   The third challenge raised by increased specialisation that I will discuss is the issue of disciplinarity itself. For the last century at least knowledge-led curricula have been synonymous with curricula based on the academic disciplines. Disciplines remain at the core of university curricula (Muller and Young 2014) and , form the basis of curricula that prepare students for one of the professions, through the process of regionalisation. Regionalisation refers the process in which several disciplines are combined in relation to the demands of a particular field of practice. Regionalisation applies both to university curricula preparing students for professional occupations such as medicine or engineering (Young and Muller 2014). However it also applies to some school-based vocational curricula preparing students for middle level technical and service occupations in fields such as healthcare, pharmacy and engineering. In each case the aim of STEM subjects is to prepare students for employment and not just further study. Furthermore, disciplines are re-contextualised to form the academic subjects of the school curriculum, at least for high achievers (Young 2011;2013). The question arises as to whether disciplines are likely to remain at the core of a knowledge-led curriculum, or, in a time of dramatic change in the pace with which new knowledge is being produced, they are too conservative and inward-looking in their assumptions and new forms of inter-disciplinary curricula are. Once this decision to develop inter-disciplinary curricula is taken the question becomes on what basis are the decisions about combining elements from more than one discipline to form a school subject made. Whereas disciplines provide the criteria of the coherence of school subjects based on them, inter-disciplinary curricula require principles for integrating the elements of different subjects, if students are to have evidence of their progress. The problem needs further research. On the one hand students are likely to respond favourably to be encouraged to make links between different subjects. On the other hand the little research there is suggests that students find it difficult to make the links that inter-disciplinary curricula pre-suppose and tend to fall back on examples from their experience. Their difficulties are added to when the integrating principles of inter-disciplinary programmes are unclear to many teachers

1.4   Knowledge and skills

15.   Partly as a consequence of the massive expansion of secondary and tertiary education the issue of what schools are for and the extent to which they should prepare young people for work has become and is likely to continue to be a major issue. This debate began in the 1970's when the youth labour market

collapsed and pupils who had previously left school for unskilled and semi-skilled work in factories, mines or domestic service were becoming un-employed school leavers at 15 or 16. The assumption was that they lacked the 'core skills' that employers were looking for and successive work-based or work related schemes were launched with at best mixed success. Gradually these schemes became pre-vocational giving a greater emphasis to general education and opened the way for increasing numbers of students to progress to further and higher education. In a sense schools did what they are designed for: prepare pupils for further study. However the model of emphasising what learners could do rather than what they knew remained attractive to policy makers and was extended to further and higher education and took the form of generic skills such as problem solving and learning to learn.

16.   The generic skills approach assumes that general principles can be abstracted from work in general as what future employees 'need to be able to do' and that these skills can be the basis of curricula relevant to any occupational field at any level. More recently they have been extended to all programmes at university as well as college. From the powerful knowledge perspective developed in this paper, a generic skills-based approach to the curriculum has weaknesses. There are no good grounds for claiming that such generic categories like 'problem solving' have more than an intuitive relationship to solving specific problems which always involve some knowledge domain. Generic skills originate from problems faced by employers. However,   demonstrating the relationship between a generic definition of problem solving and solving a domain- specific problem is difficult except in ad hoc ways. My own view is that the popularity of generic skills like 'thinking skills' and 'problem solving' has arisen because much specialist subject teaching in schools is unsatisfactory, often because subject teachers are poorly qualified in their own subject. What is worth questioning is not the importance of the intellectual processes such as 'thinking skills' themselves, but treating them as separate and sometimes separately examined subjects. Let us take the example of chemistry. Too much teaching chemistry focuses on memorisation of reactions and properties of compounds and doing 'chemical equations.' rather than focusing on the difficult theoretical questions that the equations are designed to solve. I am therefore suggesting that in this case students need to improve their skills in 'thinking like a chemist' not studying general thinking skills and trying to apply them to chemistry. Furthermore this sees 'thinking skills and 'learning to learn' not with the original meaning of skills as 'something one can or cannot do' but as an integrated part of acquiring some specialist knowledge such as chemistry.

17.   Such generic skills, often referred to as '21st century skills' because they are common to modern workplaces are better understood as check lists of important issues to be taken account of. This is to recognise that they are valued, not only by employers but by parents and educators. My argument which I touched on briefly earlier is not to dismiss their importance, but to suggest that they are not adequate as the basis of distinct programmes of study in future curricula. At t best such courses become a form of applied psychology for students with little basis in psychological theory.   Generic skills are generated from the particular cases and contexts but provide no new knowledge about such cases. In contrast, a related curriculum aim is to develop the capability for 'making generalisations' - truth claims based on theories from different disciplines. As such their 'power' depends on the disciplines themselves. Bernstein (1999) makes the useful distinction between two types of discipline (he calls them vertical and horizontal knowledge structures) and they are roughly reflected in the natural and social sciences which differ in their capacity to offer reliable and testable generalisations. If curriculum designers and policy makers want students in 2030, to be critical thinkers, good problem solvers and develop the skill of learning to learn, they need to focus their attention on the pedagogies and curricula of the different knowledge domains. Hoe far do they encourage these outcomes 'in their knowledge domain'. For example, engineers learn to solve engineering problems but their curricula rarely teach them to think about what problems engineers should be trying to solve.

1.5   *Values and the broader aims of schooling*

18.   This paper has said nothing about values, morality or citizenship as part of it might be expected that any curriculum might contribute to. This narrowing of focus is a criticism that has frequently been made of the argument for powerful knowledge made in this paper. In particular a narrow focus on the cognitive dimension of curricula not only fail to prepare specialised in the natural and social sciences for their wider role as future citizens but can stunt their imagination in conceiving of future possibilities   in their respective disciplines.

19.   How then is the specialised knowledge that students will have access to in future curricula relate to the attitudes and values they develop? This is an important question that takes far beyond formal education. In relation to specialised knowledge in different disciplines the school or college is the pre-eminent influence on pupils, even if they come from highly educated families. In relation to values and attitudes this is far from the case. All I can do here is to sketch two possibilities that policy makers and curriculum designers might consider. I will call these the specialised and non-specialised (or formal and non-formal) approaches. The specialised approach starts with the assumption that morals and attitudes are themselves a specialised field of enquiry in which the core discipline is ethics. A good case can be made that a course in ethics (and applied ethics) should be compulsory for all students, at least from the age of 16. The emphasis would be to introduce students to the different approaches to making ethical judgments rather than prescribing what judgments they should make. This has similarities with the model adopted by the International Baccalaureate with their compulsory 'theory of knowledge 'paper.

20.   The alternative is a more extra-curricular and less didactic approach which would include having a formal debating society, a range of community involvement activities, and the transfer of some school responsibilities to senior pupils (something that is far easier in residential schools) . There is no reason, in my view why the formal and less formal approaches could not be run together and be complementary. A third strand which is not often considered is what is sometimes referred to as the 'hidden curriculum'. The hidden curriculum is usually given a negative meaning, but here I want to emphasise its positive side in relation to the question of morals and attitudes. I am referring to the values that young people acquire through the curriculum. Subjects and disciplines are moral communities, and becoming a physicist or a historian, even at a neophyte level, involves acquiring values which may sometimes be at odds with the values acquired at home or in the community. To study physics or history seriously involves taking other's judgments seriously, respecting evidence and good arguments even if one does not agree with them and being willing to challenge what one has taken for granted. History and the social sciences raise issues of academic freedom and trust and put considerable responsibilities on teachers.

1.6 Concluding comments

21.   This paper has presented a sociological perspective on the priorities for the curriculum in the future. It takes a self-consciously partial approach in two ways. Firstly it gives priority to the nature of the knowledge that it should be the aim of future curricula to be based on. It justifies this philosophically with the argument that it is not possible to envisage an *educational* aim without giving a priority to knowledge; education and specifically the curriculum in the broadest sense involve the transmission of knowledge from generation to generation. Furthermore, until very recently the issue of knowledge as opposed to a focus on learners and learning, their interests, and motivations, has been strikingly absent from educational research. It is difficult to explain what is sometimes referred to as a fear of knowledge within the education community. It may be that an emphasis on knowledge is seen, however mistakenly, as elitist, by appearing to stress what a pupil may not know. Another possibility is that the fragility and fallibility of 'better knowledge' is under-emphasised. That one consequence of knowing something is knowing that there may be a better explanation or play or novel is not an obvious idea.

22.   The second sense in which this paper is partial is that it draws largely on the sub-discipline of sociology of education. It is hoped that readers without a background in this field will find this useful and will be encouraged to read further in the tradition that I draw on from Emile Durkheim to Basil Bernstein. Both are titan figures in the field but are now too rarely listed in post graduate reading lists let alone those drawn on by curriculum designers and policy makers. What the sociology of education stresses and what this short paper can no more than hint at is not only the importance of knowledge in education but the extent to which school systems and their curricula will undoubtedly shape the world between now and 2030 at the same time as they are shaped by it.

Section II: Preliminary Construct Analysis in the Skills Domain

2.1   Cognitive/Meta-cognitive Skills

23.   One major skill domain addressed through the OECD draft framework is cognitive and meta-cognitive skills. **<u>Cognitive skills</u>** that are listed in that framework include "thinking strategies" such as **remembering, understanding, analyzing, applying, creating, and evaluating**. These skills are necessary for communicating (both verbal and nonverbal communication), executive functioning, problem solving and **healthy decision making,**and higher-order thinking. Metacognition addresses the growing awareness of skills that are essentially "thinking about thinking". **<u>Metacognition</u>** reflects a child's understanding of what he or she knows and how to use that knowledge to regulate behaviour (Beran, Brandl, Perner, & Proust, 2012; Bransford, Brown, & Cocking, 1999). Tests of creative thinking and motor creativity typically involve meta-cognitive processing and emotional regulation (Kloo & Rohwer, 2012). Play and games involve either explicit or implicit rules that require children's strategic thinking and thus offer a vehicle to enhance the emergence of children's metacognitive skills (M. D. Schmidt, Jager, Egger, Roebers, & Conzelmann, 2015) including**self-awareness, self-reflection, and learning strategies**. Learning strategies or "learning about learning" as a key competency for lifelong learning that is now an emphasized goal for education in many European countries (Kikas & Jogi, 2016). These skills are necessary for recognizing one's strengths and challenges in all other domains (knowledge, skills, attitudes and values).

2.1.1   Terms- Setting the Stage

24.   Traditionally, cognitive skills have been discussed interchangeably with academic performance, and therefore have been taught through direct skill instruction (mathematics, science, and language) and measured through standardized achievement tests. Oftentimes in the literature, cognitive skills are referred to interchangeably with intellectual development (Eccles & Gootman, 2002) and academic skills.

25.   The components of cognitive skills become more apparent through examining the way that it is typically measured in the empirical literature. For instance, reading and math scores are often used as indicators highlighting two key components to cognition: literacy and math skills. The definition of literacy is complex, and constantly changing with culture and context (Ntiri, 2009). **Literacy** includes procedural knowledge (the ability to do something) more than declarative knowledge (knowing facts) (Venezky, 1990). In essence, contemporary definitions acknowledge literacy as much a culturally and socially grounded construct as it is basic ability in reading, writing, and language (Ntiri, 2009). **Math skills** include calculation, applied problem solving, identification, and broad mathematics abilities (Woodcock-Johnson Psychoeducational Assessment-Revised; Woodcock & Johnson, 1989). Standardized assessments (mathematics, science, and reading achievement) are predominantly used as measures of cognitive skills in empirical research (Hanushek & Woessmann, 2008). These assessments tend to measure "general knowledge" (e.g. The General Educational Development (GED) test that is intended to measure knowledge that one should have at the completion of high school)(Heckman & Kautz, 2014) or basically **skills that are essential for classroom success** (e.g. understanding language, remembering and reporting on key

facts, problem solving, and maintaining focus throughout instruction and test taking tasks) (Kautz et al., 2014). This notion is further reinforced through the use of grades or grade point average as a measure of cognitive ability, confounding school performance with cognitive ability (Kautz et al., 2014). The availability of other measures of cognitive skills is limited, particularly in educational data, which has caused a very narrow understanding. Education scientist are beginning to recognize this limitation and expand our understanding through using measures of learning strategies (e.g. memorization or organization skills) in addition to traditional tests (e.g. Kikas & Jogi, 2016). Additionally, **school quantity** (the amount or number of years of formal education) is also often used as in indicator of cognitive ability, often due to the inability to disentangle educational attainment from cognitive performance in developed countries (Hanushek & Woessmann, 2008). Cognitive abilities are also discussed in terms of knowledge and skills, where cognitive **knowledge is predominately linked to formal schooling** and **cognitive skills are linked more to experiences** with family members, peers, and culture (Hanushek & Woessmann, 2008).

26.   Rohde and Thompson (2006) identify three components of "general cognitive ability" that are identified in the literature: **working memory**, **processing speed**, and **spatial ability**. They were able to identify these as distinct cognitive processes in a factor analysis. Processing speed and working memory, together comprise what is referred to as **mental efficiency** (Rohde & Thompson, 2006; Vernon, 1983; Fry & Hale, 1996). Spatial ability involves **visual perception** and **mental manipulation of matter** (Rohde & Thompson, 2006). Spatial ability is typically linked to **math assessments** and spatial ability tasks are shown to predict SAT performance on the math sections specifically (Rohde & Thompson, 2006).

27.   Creative Thinking – creative thinking is the process through which one develops novel ideas, approaches, or information (Mumford, Medeiros, & Partlow, 2012). Creative thinking is sited as a key skill for innovation and entrepreneurship (Ahmetoglu, Harding, Akhtar, & Chamorro-Premuzic, 2015).

28.   Curiosity is "the predisposition to recognize and search for new knowledge and experiences" (p.142) and is linked to other skills such as optimism, humor, and expressiveness, and also to other cognitive skills such as creative thinking (Kashdan, Sherman, Yarbro, & Funder, 2013). Findings from a factor analysis of curiosity revealed that individuals that are high on curiosity also rated themselves high on "appreciative of beauty" and "nonjudgement of other people".

2.1.2   *Impact on later outcomes*

28.   The research, to date, is limited to mostly correlational findings between general cognitive skills and important outcomes. The literature is scarce in terms of causational studies and also in looking at specific domains of cognitive skills, such as those outlined by the OECD (Pellegrino & Hilton, 2013). The recent proliferation of functional neuroimaging studies offers promise of deconstructing these components of cognitive skills in future studies to advance our understanding and ultimately lead to more intentional programs and practices.

29.   Empirical support for metacognitive skills predicting education, workforce, and health outcomes is quite limited, due to the relative newness of the field and difficulty in measuring them. For this reason, the majority of the literature discussed below focuses more on cognitive skills than on metacognitive skills. Metacognitive skills also develop later, predominately in adolescence, which is unique to many of the other skills discussed in this paper (Jacobs & Klaczynski, 2002). Some components of metacognition are encompassed in the social and emotional literature, such as self-awareness, and are therefore, discussed in that section of this paper.

30.	Environmental enrichment during early childhood has been consistently linked to later cognitive abilities, suggesting that social and contextual stimuli (such as maternal warmth, social interactions, etc.) are key leverage points for cognitive intervention (Hackman, Farah, & Meaney, 2010). Early childhood is a critical period for cognitive development (Kautz et al., 2014), which is evidenced through comparing early intervention efforts to later or adolescent intervention efforts. In fact, in a review of over 20 programs, only those that targeted children younger than 3 years of age had any long term impact on IQ (Kautz et al., 2014).

Education outcomes

31.	There is much more empirical support for the long-term impacts of early intervention efforts as it pertains to all domain areas, but particularly in the cognitive skills domain. Interventions that target adolescence are more scarce and often do not (yet) have long term impacts documented (Kautz et al., 2014). Nevertheless, the importance of cognitive skills in school and life success is well-documented. Inadequate cognitive stimulation during early childhood is cited as a major risk factor for children (e.g. Walker et al., 2007). Early cognitive stimulation is associated with long term positive impacts on both cognitive and social and emotional competency (Walker et al., 2007). Specifically, cognitive stimulation from a family investment model has been operationalized as the availability of books, computers, trips, and parental communication (Hackman, Farrah, & Meaney, 2010). Unfortunately, research on cognitive skills predominately focuses on school/educational settings, so many other important factors contributing to cognitive skills (communities, families, peers, culture, etc.) and many other outcomes that are impacted by cognitive skills (health, economic well-being and contribution, etc.) are not as well recorded (Hanushek &Woessman, 2008). There is some consensus that in order to get the most return on investment, early cognitive stimulation is critical – in terms of being happy, healthy, contributing workers and citizens (Knudsen, Heckman, Cameron, & Shonkoff, 2006).

32.	Intervention studies, such as the Abercedarian Project, that target cognitive stimulation in early childhood, have found long-term positive impacts on education; both in terms of cognitive abilities, as measured by IQ tests, and in terms of academic achievement, as measured by reading and math scales on the Woodcock-Johnson (Campbell et al., 2002). Preschool interventions that target reading, writing, and math skills can increase high school graduation rates by 7 percent (Kautz et al., 2014; Reynolds et al., 2011). Early cognitive stimulation is critical. Cognitive stimulation can occur in a variety of formats such as parental warmth, engaging environments, word exposure, etc. Studies have examined lack of cognitive stimulation in very low SES families and shown long term cognitive deficits in cognitive skills such as vocabulary, executive function, language, etc. Additionally, programs aimed at increasing cognitive stimulation can act as a protective factor to buffer the impact of low SES status on children (Hackman, Farrah, & Meaney, 2010). Cognitive stimulation continues to be important into adolescence and is a key asset of positive youth development (Eccles & Gootman, 2002). Both early childhood and school-aged cognitive abilities (reading and math scores) have been consistently linked to educational attainment (Campbell et al., 2002; Hanushek & Woessmann, 2008), where youth with higher cognitive abilities are more likely to complete more years of formal schooling. High school GPA has also been predictive of college degree completion (Hall et al., 2008) In U.S. studies, higher quality education (e.g. more spending per student or lower teacher-student ratio) is related to increased cognitive skills (scores on math, reading, and science standardized tests), which is turn leads to increased individual earnings (Hanushek & Woessmann, 2008).

33.	Some evidence exists linking particular cognitive skills to particular educational outcomes. For instance, studies have shown that **processing speed** and **spatial ability** predict math performance on the SAT (Rohde & Thompson, 2006). In contrast, general cognitive ability (**vocabulary** and **general**

intelligence tests) predicts **overall academic achievement** (SAT test scores, GPA, and standardized achievement test scores) better than measures of specific components of cognitive ability (such as working memory, processing speed, or spatial ability), supporting the notion that "well-rounded" cognitive abilities are necessary for academic success (Rohde & Thompson, 2006).

Workforce

34.   There is a direct relationship between population level as well as individual level cognitive skills (measured by math, science, and reading scores) and many economic outcomes. In other words, higher cognitive skills for a particular group of people serves everyone in that economic system. Studies have found links between population level cognitive skills (scores on math, science, and reading tests) and individual earnings, distribution of income, and economic growth (Hanushek & Woessmann, 2008). Further, both high- (general cognitive ability) and low-level (e.g. working memory, processing speed, spatial ability) cognitive skills are essential for individuals; once again highlighting the importance of a well-rounded cognitive repertoire (e.g. Rhode & Thompson, 2006). Several U.S. studies have found direct links between cognitive performance (standardized achievement test scores) and individual earnings (e.g. Mulligan, 1999; Murnane et al., 2000; Lazear, 2003; Murname, Willett, Duhaldeborde, & Tyler, 2000). Specifically, one standard deviation increase in high school math performance is associated with 12% higher annual income, on average, for each and every year in the labor market (Hanushek & Woessmann, 2008). Similar findings have been found in Canadian (Finnie & Meng, 2002; Green & Riddell, 2004) and UK (McIntosh & Vignoles, 2001) populations, as well. It's important to note that in a study that included gender in the analysis, the increase in income was higher for males than for females, at 15% and 10% respectively (Murnane et al., 2000).

35.   Researchers suggest that cognitive skills are only one of many factors that are valued in the labor market (Kautz et al., 2014; Lippman et al., 2015; Lippman, Atienza, Rivers, & Keith, 2008). Some evidence suggests that while employers value school attainment as an indicator when initially hiring, that once hired, employers place more value on cognitive skills, social and emotional skills, and performance. Employers have referred to numeracy and literacy as "basic skills" that are one of five essential skills necessary for employment (Kautz et al., 2014; Stasz, 2001). Teasing apart the role of cognitive skills and educational attainment in long term employment situations is not yet empirically understood (Hanushek & Woessmann, 2008). Standardized achievement tests only account for 17% of the variance in predicting life earnings, indicating that (1) **these tests may not be capturing the full breadth of "cognitive skills"** and (2) **the interplay between cognitive and non-cognitive skill development may be more crucial** (Kautz et al., 2014). While future studies need to distinguish between cognitive knowledge and skills and educational attainment, there is evidence that cognitive skills (mathematics, science, and reading scores) account for economic growth, above and beyond years of schooling (Hanushek & Woessmann, 2008).

36.   Creativity and innovation, or the ability to come up with alternative or novel ideas and approaches, is also viewed as a valuable skill in the workforce and linked to evaluations of performance and promotion (Lippman et al., 2015)). Limited measures, and therefore studies of creativity exist (Lippman, Moore, & McIntosh, 2011). Health and well-being

37.   Cognitive skills and metacognitive skills have indirectly been linked to indicators of health such as **social and emotional well-be**ing. Cognitive stimulation (learning opportunities) in early childhood has long-term positive impacts on **social and emotional functioning** (Walker et al., 2007). Metacognition is thought to be a precursor to **healthy decision-making**, where individuals who are further developed metacognitively, are better equipped to **monitor and think about the decision-making process** (Jacobs & Klaczybsji, 2002). Direct links between cognitive skills and health outcomes are not common in the empirical literature, where more attention has been focused on education and workforce outcomes (Campbell et al., 2014). Follow-up from the Abecedarian Study did find long term effects on adult physical

health such as lower symptoms of cardiovascular and metabolic diseases (Campbell et al., 2015). Preschool programs aimed at increasing reading, writing, and math skills were linked to decreased rates of substance abuse (4-6%). Moreover, a recent longitudinal study found that adolescent cognitive abilities were significantly related to **physical and mental health** decades later (at age 41), such as **lower rates of smoking, obesity, and depression** (Kaestner & Callison, 2011).

Citizenship

38.   Less evidence exists for the role of cognitive and metacognitive skills in predicting citizenship, except through the avenues already discussed (education and workforce competence). Preschool programs aimed at increasing reading, writing, and math skills have found long term impacts on **decreasing arrest rate**s, by about 6 percent (Kautz et al., 2014; Reynolds et al., 2011). Some research has linked cognitive abilities to **voter turnout and interest in politics** (Denny & Doyle, 2008). Some research on college-aged individuals suggests that specific cognitive skills such as literacy and civic skills such as social science credit hours are predictive of **political engagement** (Hillygus, 2005). The 1970 British Cohort Study also found that higher childhood intelligence was predictive of likelihood to vote in adulthood and other forms of civic engagement such as **signing petitions, attending rallies, and be more interested in political issues** (Deary, Batty, & Gale, 2008). Educational attainment has also been linked to adult civic engagement (Pelligrino & Hilton, 2013). It is important to note that many of the "civic skills" related to citizenship and civic engagement outlined in this line of research overlap quite a bit with social and emotional skills such as **social awareness, engagement, communication skills, and societal bonding/motivation to contribute to society**.

Critical thinking skills

39.   Citizens with critical thinking skills are more likely to be self-sufficient and, thus, less dependent on the state's social spending (Facione, 1998); are more likely to be equipped to give back to society such as through social entrepreneurship and prosocial behaviours (Peredo and McLean, 2006). Critical thinking skills are seen as necessary to enter the workforce; a common critique of higher education is the lack of development in these skills, as evidenced by recent college grads who are ill-prepared to enter the workforce and deficient in critical thinking skills (Flores et al., 2012).

2.1.3   Relation to other constructs within and across domains

Cognitive skills and non-cognitive skills

40.   One key understanding is that "skills beget skills"; "all capabilities are built on a foundation of capacities that are developed earlier… (1) early learning confers value on acquired skills, which leads to self-reinforcing motivation to learn more, and (2) early mastery of a range of cognitive, social, and emotional competencies makes learning at later ages more efficient and, therefore, easier and more likely to continue." (p. 10156; Knudsen, Heckman, Cameron, & Shonkoff, 2006). It is this understanding that makes it nearly impossible to disentangle cognitive skills from non-cognitive skills. For instance, self-management and communications skills are two social and emotional skills that are essential for learning or cognitive development to take place in the classroom context (Kautz et al., 2014). This concept is illustrated in much of the early intervention work (e.g. Perry Preschool, Abercedarian, Chicago Child-Parent center) that shows early education efforts leading to increased social skills in adolescence and eventually increased positive outcomes in adulthood. Skills in early childhood become more differentiated as children age in adolescence. Due to the inconsistency in measures gathered across such studies, it is difficult to determine the precise developmental sequence of these skills and which skills can be specifically attributed to which positive short or long term effects. Future work is needed to empirically explore these relations across the lifespan.

Higher order skills and other domains

41.   Higher order skills (problem solving, critical thinking, goal setting, and decision-making) overlap with other domains. **Critical thinking** includes inductive and deductive reasoning, making correct analyses, inferences, and evaluations (Facione et al., 1995). Furthermore, components of cognitive skills are interwoven with social and emotional skills so closely that is it difficult to tease apart and attribute educational gains to one category or another. For instance, critical thinking, by definition is "questioning and evaluating ideas and solutions"(OECD). This definition embodies components of metacognition, social and emotional skills (reflection and evaluation within a cultural context), and even attitudes and values (moral judgment and integration with one's own goals and values), depending on the context. Additionally, critical thinking skills are significantly impacted by *both* traditional educational experiences and out-of-classroom experiences. Critical thinking is a higher order cognitive skill. Definitions of critical thinking skills vary. On one end, critical thinking is conceptualized as "thinking about thinking", which, in essence is the same definition that is often used for metacognition. On the other end, critical thinking is conceptualized as a combination and synchrony of many cognitive skills including experiencing, observing, analyzing, conceptualizing, synthesizing, evaluating, reflecting, and communicating (Howard, Le-Ping Tang, & Austin, 2015). The more complex conceptualization overlaps with social and emotional skills (such as reflecting and communicating) and attitudes and values (such as experiencing, conceptualizing, and evaluating). Both ends of the the definition of critical thinking highlight the multidimensionality and obvious overlap with other skill domains.

42.   **Problem-Solving**- problem solving skills are often discussed in terms of a particular subject area such as mathematics or social situations. Problem solving in general includes the ability to identify a problem, compile information from several sources to address the problem, generate possible solutions to that problem, and weigh potential consequences of solutions (Lippman et al., 2015).

43.   **Problem-solving and decision-making skills** are also inextricably linked to social and emotional skills and lead to positive academic outcomes (Pelligrino and Hilton, Guerra and Bradshaw, 2008). Being able to making healthy and responsible decisions is a key element in the social and emotional learning framework and the positive youth development frameworks (Elias et al., 2007; Guerra & Bradshaw, 2008). Decision making becomes especially important as youth transition from childhood to adolescence and have more autonomy and independence. In fact, adolescents with better decision making abilities are less likely to engage in risky and delinquent behaviours (Albert & Steinberg, 2011). Problem solving and decision making skills are often necessary for social interactions, such as navigating peer conflict or peer pressure.

44.   **Goal setting**, like the previous higher order cognitive skills, contains a value and cultural component and oftentimes extends beyond the individual, therefore lending to overlap within and across domains. Goal setting requires self-awareness (knowledge of needs), metacognition (acknowledgement of thoughts and abilities), and values (appraisal within context of one's culture and belief systems).

Regulation and Knowledge of Cognition

45.   Metacognitive skills ("procedural knowledge that is required for the actual regulation of, and control over one's learning activities", (p. 90, Veenman, Wilhelm, & Buishuizen)) have been linked to education indirectly through impacting the process of learning (Veenman, Wilhelm, & Beishuizen, 2004). For instance, metacognition significantly predicts critical thinking, a key component of learning (Magno, 2010). Components of metacognition become increasingly important as children enter secondary school, where reasoning, regulation, and reflection become more integral to the curriculum. There is a current proliferation of mindfulness-based interventions in schools that target these skills specifically. Preliminary findings have evidenced that these interventions decrease stress and anxiety, increase optimism, increase

social skills, increase cognitive skills, and increase academic achievement (e.g. Schonert-Reichl, et al., 2015; Schonert-Reichl & Stewart Lawlor, 2010; Beauchemin, Hutchins, & Patterson, 2008). Ongoing findings from these studies can better inform the role of metacognition in educational practices in the very near future.

2.1.3 *Suggested additional constructs*

Knowledge and understanding of other cultures

46.   One key area of cognitive development, noted in the literature more recently, is the knowledge and understanding of other cultures (Eccles & Gootman, 2002). Key developmental scientist (e.g. Eccles & Gootman, 2002) identify in-depth knowledge of more than one culture as a crucial component to cognitive development, particularly as youth get older. This aspect of cognitive development seems to have growing importance as youth today are faced with global interconnection. As globalization trickles down into education, this may include promoting cognitive skills such as exposure and training in other languages, perspective-taking and empathy (which are included in the social and emotional domain), and expanding attitudes and values to be more inclusive and reflective of a broader social context (PISA Global Competency, 2016).

Motivation

47.   In Zusho, Pintrich, & Coppola's (2003) "General Model of Motivation and Self-Regulated Learning", learning occurs in tandem with two processes: motivational processes and cognitive processes. Motivational processes consist of skills/processes in the both metacognitive and social and emotional domain, such as self-efficacy beliefs and goal orientation (respectively). Cognitive processes consist of skills/processes in both the cognitive and social and emotional domain, such as "cognitive strategies" and "self-regulatory strategies", respectively. In order words, this model highlights the interconnection among these skills and the need for skills in multiple domains to be present and practiced in order for learning to occur (Zusho, Pintrich, & Copploa, 2003).

48.   Motivation is a key component to cognitive performance. External motivations, like offering a child candy, during a test can increase performance up to one standard deviation (Kautz et al., 2014). Intrinsic motivation is key to learning in secondary and tertiary education settings; and has in fact been linked to performance in reading in math, as well as social and emotional functioning (increased persistence, increased happiness, and increased prosocial behaviour) (Froiland, Oros, Smith, & Hirhcert, 2012).Motivation is a multi-faceted construct that spans many domains in the 2030 Learning Framework, including social and emotional skills, and attitudes and values.

2.1.4 *Malleability*

49.   IQ tests do not fully capture all domains of cognitive ability. Despite this, IQ tests are often used as the metric for intervention effects on individual or group cognitive ability. Studies have shown that IQ scores are not particularly malleable, in that they often remain quite stable across the lifespan. In fact, interventions that have shown change in IQ over time, has been targeted in early childhood. Programs and practices aimed at elementary-aged or adolescent youth, should not use IQ tests as a measure of effectiveness (Kautz et al., 2014). Cognitive skills, on the other hand, can be fostered and are malleable over time.

2.1.5 *Measurability*

50.   The scientific community has long relied on subject performance (math, reading, science) as an adequate measure of cognitive ability. Examples of these assessments are the Woodcock-Johnson, PISA,

and nationally normed benchmark assessments (e.g. SAT in the United States). These measures do not allow us to articulate what specific cognitive competencies are responsible for specific outcomes in adulthood. Areas that are better understood are those that closely map onto social and emotional skills such as problem solving and decision making abilities. These types of skills entail both a cognitive component (critical thinking, general knowledge, identifying multiple solutions) and a social and emotional component (value placement, self-awareness, self-regulation, consideration of others and the world at large, etc.). Assessment of these skills is becoming more common but is less universal to educational practice due to the lack of policy requiring such skills to be recorded in academic records or valuing such skills as benchmarks on standardized achievement tests. In the workforce literature, higher order thinking skills such as critical thinking, problem-solving, and decision-making are often assessed together, making it difficult to tease out their separate effects (Lippman et al., 2015). Measures of higher order thinking can be found in PISA, PIAAC, the Chinese Positive Youth Development Scale, the World Bank's Step Skills Survey, the Social and Emotional Health Model (SEHM), the Anchored BFI, among others (Lippman et al., forthcoming).

2.2 *Social and Emotional Skills*

51.   A major skill domain addressed by the OECD model includes social and emotional skills. These skills are identified as grounding an individuals' strengths and capacities to construct their personality and character (OECD, 2015). Social and emotional skills encompass **self-awareness and regulation, communication, engagement (interpersonal engagement and intellectual engagement), building and maintaining healthy relationships, and setting and achieving goals**. Social and emotional skills are manifested through an individuals' thoughts, feelings, and behaviours.

2.2.1 *Terms and Definitions- Setting the Stage*

52.   There are several theoretical models that identify and define the key constructs of social and emotional skills necessary for school and life success. These include, but are not limited to, Social and Emotional Learning (SEL; Elias et al., 1997), Positive Youth Development (PYD; Lerner et al., 2002), and Social Competence (SC; Waters & Sroufe, 1983). The research in this area has greatly expanded in recent decades, as there is increasing recognition for the importance of these skills, that were inaccurately coined as "non-cognitive", since they all involve cognition (Zins, Bloodworth, Weissberg, & Walberg, 2007). All social and emotional development frameworks seem to encompass four main skills; (1) **self-control, (2) positive self-orientation, (3) engagement with others, and (4) societal bonding/motivation to contribute to society** (Tolan, Ross, Arkin, Godine, & Clark, 2016). Through decades of research and intervention efficacy studies, these skills have been linked to important developmental outcomes for youth such as school and workforce success, and adult health, happiness, and thriving (Tolan et al., 2016).

53.   Social and emotional skills are the foundational components of human functioning, and thus have also been coined as "practical wisdom" in recent literature (Eccles & Gootman, 2002). Perhaps the most fundamental of these skills is self-control, or self-regulation. **Self-regulation** has been defined by CASEL as the ability to manage one's emotions, thoughts, and behaviours and the ability to set and achieve goals (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). However, goal setting is also seen as a separate construct that requires self-regulation, but is not itself self-regulation, and thus, it is discussed below as a separate skill, and in the cognitive skill section. A more common understanding of **self-control** (a term preferred by employers to self-regulation) is the ability to delay gratification, control impulses, direct and focus attention, manage emotions, and regulate behaviours (Lippman et al., 2015). Self-regulation is needed in all facets of life; interacting with others, sitting through a school lesson, negotiating with co-workers or clients, managing conflict, etc. Nearly all other skill domains are dependent on self-regulation abilities. Some research has suggested that self-regulation is the single best predictor of adult success (Steinberg, 2014; Zimmerman, Phelps, & Lerner, 2003; Freund & Bates, 2002; Lerner et al., 2005; Moffitt

et al., 2011). **Self-awareness** is the ability to recognize one's thoughts, feelings, and behaviours . (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). Having a strong sense of self , or a **positive self-concept**, (including self-awareness, self-confidence, self-worth, and self-efficacy) is foundational to a health identiy, and leads to an successful goal-setting and aspirations, having a positive future outlook, and having the confidence to navigate life with a sense of meaning and purpose.

54.   **Engagement** is conceptualized by CASEL as the ability to communicate, cooperate, and collaborate (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). Engaging with others through prosocial connections, positive relationships, and collaboration, creates a more satisfied and efficient society. **Social skills** underlie these higher level skills of cooperation and collaboration, and include: the ability to get along well with others and function constructively in groups, including **respecting** and expressing appreciation for others, being able to work well with others, using context appropriate behaviour, and resolving conflicts (Lippman et al., 2014b, 2015). A specific case of engagement is school engagement, which includes cognitive, behavioral, and affective components (Fredericks et al., 2005).

55.   **Forgiveness** enables positive relationships by removing obstacles in relationships, especially overcoming negative feelings in response to the perception of being harmed by another person, or even oneself (Lippman et al, 2014b).

56.   **Societal bonding or social awareness** is the ability to connect with available resources, value culture and diversity, and understand others' perspectives (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). Creating a bond with one's society and sharing a core set of moral beliefs and standards helps individuals make responsible and ethical decisions, and have a sense of meaning in life that is placed in a larger sense of contribution. This is related to the values of benevolence and integrity/ethics as well as purpose, discussed in the section of this paper on values. Bonding is based upon **Trust**, which can be defined as relying on others, or relying on oneself, for example, on one's intuition. It is considered a facet of the Big Five Personality Factor of Agreeableness, and is more trait-like than other social and emotional skills, but the Big 5 have been aligned to skills for the purposes of social and emotional skill development, as in the OECD framework for social and emotional skills in cities (OECD, 2015b), where it appears under the grouping called **"collaboration."** Trust is a tendency formed in childhood, but it has increasing bearing upon anonymous interactions in present and future as well as through social media. "Interpersonal trust, especially generalised trust, is a strong predictor of economic prosperity (Fukuyama, 1995; Knack and Keefer, 1997; Putnam, 1993) and individual well-being (Helliwell and Wang, 2010), although recent research by Butler, Guiso and Giuliano (2009) also shows that, at the individual level, excessive trust can be detrimental" (OECD 2016, p.).

57.   **Motivation** to contribute to one's society stems from societal bonding, but includes the concept of curiosity (discussed more thoroughly in the cognitive section), or one's openness and interest in new experiences and the desire to perform prosocial behaviours (Santos & Primi, 2014). This is related to the prosocial values described in the values section.

58.   Setting and achieving goals requires components of social awareness, motivation, and self-regulation. **Goal orientation** can be defined as the ability to make workable plans and take action to achieve his/her goals (Lippman et al., 2014b). It becomes particularly salient during adolescence, when portions of the brain involved in short and long term appraisal are being developed and integrated (Crone & Dahl, 2012). After the onset of puberty, goal setting can shift rapidly and is intricately linked to social contexts. Brain research suggests that adolescents are neurologically wired to be motivated more towards short term goals rather than long term goals, and that this is actually beneficial in terms of facilitating learning, creative thinking, and problem solving. As the brain matures into adulthood, long term goal setting becomes more of a priority (Crone & Dahl, 2012).

59.   **Perseverance,** or relatedly, diligence, reliability, tenacity, band being hardworking and dependable, is the performance of tasks with thoroughness and effort from start to finish where one can be counted on to follow through with commitments (Lippman et al., 2014). This construct is often considered sub-elements of the Big Five Personality Factor of Conscientiousness. **Grit** is a combination of perseverance and goal orientation; defined as the steadfast pursuit of a goal despite obstacles (Duckworth & Gross, 2014). Grit is predictive of educational attainment, likelihood to achieve goals, likelihood to graduate on time, and likelihood to "stick it out" in a profession (specifically studied in teachers and cadets) (Duckworth & Gross, 2014).

60.   **Compassion** is a concept gaining traction in the literature and is now included in some social and emotional learning curriculum (e.g. the Compassionate Schools Curriculum developed at UVA). Compassion is defined as the awareness of suffering in others *and* the desire and effort to relieve that suffering (Bentsson, Soderstrom, & Terjestam, 2015). In essence, compassion encompasses **empathy** which is awareness of another's experience (Davis, 1983), and it includes the cognitive and affective ability to feel and understand what someone else is experiencing (Lippman et al., 2014b).

61.   **Resilience** is coping and functioning well despite adversity or trauma, or the ability to "bounce back" (Masten, 2001). Resilience is fostering through the promotion of protective factors, such as social and emotional skills, and through the reduction of risk factors.   It is a multifaceted construct that includes many social and emotional skills, as well as social supports. While there are many models of resilience, common elements include:

Individual Behaviors, Attitudes, and Competencies:

- Physical health supports resilience, including getting enough sleep, eating well, exercising, and enjoying good health.

- Social and emotional competencies that promote resilience include stress management; a sense of control over one's life; positive relationship to self-including self-efficacy, self-regulation, and self-esteem; hopefulness and goal-setting with the motivation and perseverance needed to reach those goals; and social competence.

- Cognitive competencies that help include insightfulness and general skills such as problem-solving, information processing, and intellectual ability, and being able to construct meaning from adverse events.

Family, School, and Community Support

- A positive and supportive family, including warmth, stability, cohesiveness, a positive parenting style, and high expectations.

- Presence of a caring adult outside the family, such as a teacher, counselor, coach, or mentor

- Belonging to groups and institutions, like schools, clubs, organizations, and religious communities (Lippman and Schmidt, 2014)

62.   A resilience framework suggests that increasing protective factors will mitigate the effects of likely risks that individuals will face in their lifetime. The OECD suggests that students can become resilient through motivation, engagement, self-efficacy, and by receiving support from their teachers. The concept of resilience can be applied to mathematics performance as well. PISA 2012 results found that one

fourth of students in the lowest socioeconomic level across countries studied beat the odds and performed better in mathematics proficiency than expected (OECD, 2014).

63.   The **Big Five Personality Factors** facets of Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuratocism/Emotional Stability, can be aligned with social and emotional skills.. While there is still debate in the field on how to define each factor and its facets and how each facet corresponds to skills, an emerging literature has used factor analysis to examine various measures and help define more universally the facets and skills subsumed under each factor (Roberts et al., 2005; Roberts et al., 2015; Woo et al., 2014; Kautz et al., 2014; OECD, 2015b). For example, the Big 5 Factor of Conscientiousness includes the skills of organized, hardworking and dependable, self-motivated, self-control, and integrity/ethics (see Lippman et al., 2015 for a cross walk of all of the Big 5 factors to soft skills based upon this literature). Current research on personality attributes such as the Big Five Personality Factors shows that they themselves are malleable over the life course, so that the idea of personality being an unmalleable "trait" no longer has currency, although they are considered enduring tendencies. Some of the facets of the Big 5 do not map onto skills at all, such as gregariousness, which is under the Big 5 Factor of Extraversion, and thus is not relevant to this paper.

2.2.2   Links to later outcomes

64.   Youth programs that target social and emotional skills (non-cognitive) are more successful than academic-centered (cognitive) programs in promoting long-term developmental changes in youth that lead to desirable outcomes; such as school completion and workforce success (Kautz et al., 2014; Zins, Bloodworth, Weissberg, & Walberg, 2007). This is especially true for adolescent populations (Kautz et al., 2014). The interrelation of these skills and their relation to other skills in the OECD framework is a topic of current study that scientist point out as an area that needs to be better understood (Blakemore & Mills, 2014).Education

Universal social and emotional learning programs

65.   Countless studies have documented the role of social and emotional skills in academic success. A meta-analysis of 213 SEL programs (programs that target one or more social and emotional skill falling under the CASEL framework; self-awareness, self-management, social awareness, responsible decision making, and relationship skills) found that implementing programs aimed at promoting these skills raises children's performance on high stakes achievement tests by 11-percentile points, on average (Durlak et al., 2011). Additionally, afterschool programs that target social and emotional skill promotion have also seen positive effects in school performance (Durlak, Weissberg, & Pachan, 2010). Community-based social and emotional interventions have shown effects on increasing school attendance, high school graduation, and chances of attending college (Hawkins et al., 2005). Low levels of social and emotional skills have also been linked with poor academic performance.

Self-control

66.   For instance, low self-control is related to poor school performance and increased likelihood of dropping out of school in a number of studies (Moffitt et al., 2011). Socially competent students also create a more productive classroom, with decreased problem behaviours and peer conflict.

Engagement

67.   Not surprisingly, engagement has also been directly tied to educational attainment and outcomes (Pike, Smart, & Ethington, 2012). Youth who were quantified as more engaged in high school are more likely to attend college (Tuominen-Soini & Salmela-Aro, 2013).

68.	Social Skills, empathy, educational engagement, diligence and reliability, and goal orientation were all related in multivariate analyses to higher grades in a national sample of 12-17 year olds (Lippman et al., 2014b).

Workforce

Self-control, positive self-concept, social skills, communication

69.	Some site GED or traditional "achievement test" performance as evidence for social and emotional skills being crucial predictors of workforce success. While the GED is a measure of cognitive ability, and can be directly compared to cognitive performance of traditional high school graduates, recipients of GEDs have lesser success completing college and less success in the workforce – both in obtaining and maintaining a job (Kautz et al., 2014). Research suggests that employers do not simply look at qualifications or cognitive abilities in a potential employee. Surveys of employers reveal that the top skills valued in the workforce actually fall into the social and emotional category, such as **communication, working well with others, self-management, and self-awareness** (e.g. University of Kent's Top Ten skills that employers want, 2016; Kautz et al., 2014). In a systematic review of empirical literature, employer surveys, literature reviews, consensus panels like DeSeCo, and other research, Lippman et al (2015) identified a similar set of five key skills that foster success in employment, performance, wages, and entrepreneurial success: **self-control, positive self-concept, social skills, communication, and higher order thinking skills**. This list encompasses social and emotional, cognitive, metacognitive and attitudes domains. Social and emotional interventions have demonstrated impact on participants' workforce success. Community-based social and emotional interventions have shown effects on increasing the likelihood of participants' employment and sustaining job positions longer in adulthood (Hawkins et al., 2005).

Health

Self-control

70.	One aspect of social and emotional skills that has been continually linked to important health outcomes is self-control. Self-control during childhood predicts adult health (physical health, substance use) and societal contribution (finances, criminal offenses) above and beyond intelligence and social class (Moffitt et al., 2010). In fact, siblings with more self-control, have better outcomes such as decreased likelihood of smoking, drug use, alcohol abuse, or being in poor health as an adult (Moffitt et al., 2010).

71.	Social skills, empathy, forgiveness, diligence and reliability(perseverance), educational engagement, and goal orientation were all related to less smoking and depression and less fighting among adolescents ages 12-17 in multivariate analyses (Lippman et al., 2014b).

Engagement and supportive relationships

72.	Other social and emotional skills point to indicators of well-being in adulthood. For instance, engagement with others and the establishment of supportive relationships during adolescence is one of the best predictors of adult life satisfaction and well-being (Seigel, 2013). Social and emotional functioning during youth is also, not surprisingly, predictive of social and emotional functioning and mental health in adulthood (Monahan & Steinberg, 2011; Steinberg; 2014). Therefore, it is important to cultivate social and emotional skills throughout the lifespan, but especially during the school-aged years, to lay the foundation for social and emotional health in adulthood.

73.	Compassion, empathy, and mindfulness concepts are now being implemented in school settings through meditation type practices. These approaches show promising results, including social and

emotional benefits such as increased emotional processing and empathy and direct health benefits through a reduction in the physiological stress response, that can be beneficial to the immune system (Hofman, Grossman, & Hinton, 2011).

Citizenship

Self-control

74.　　A large meta-analysis of SEL programs (that addressed at least one of the following constructs; self-awareness, self-management, social awareness, relationship skills, or responsible decision making) found that the promotion of social and emotional skills leads to positive changes in attitudes (mean effect size, $d = .23$) and behaviours (mean effect size, $d = 0.24$). Additionally, the development of key social and emotional skills such as self-control, has been linked to decreases in delinquency and crime (Moffit et al., 2011). Poor self-control is also related to poor money management and financial security in adulthood (Moffit et al., 2011). Social and emotional learning programs have demonstrated effects on decreasing rates of aggression, conduct problems, and delinquency (Durlak et al., 2011). Ultimately, promoting self-control and other social and emotional skills can have profound impacts on decreasing problems that place a high burden on society.

2.2.3　Interrelationships between constructs

75.　　Metacognition can also be considered a social and emotional skill. Specifically, the ability to reflect on thoughts and behaviours also falls under the category of self-awareness (defined above). Studies have shown that this ability is linked to improved skills for learning (Weil et al., 2013; Metcalfe & Finn, 2008; Efklides, 2009). Interestingly, studies have also found that females tend to perform better on metacognitive tasks than male counterparts (Weil et al., 2013). Social and emotional skills are very interrelated with many cognitive and metacognitive skills, as well as knowledge, attitudes and values. Working through a cognitive task takes goal-setting, self-control, oftentimes communication or collaboration with others, reflection on possible solutions and outcomes, and the decision to select a specific solution or plan of action.

2.2.4　Malleability

76.　　These skills have also been shown to be sensitive to change, or malleable, through school-based interventions, mentoring, community, and after-school programming (Durlak et al., 2011; Hawkins et al., 2005; Durlak, Weissberg, & Pachan, 2010). Social and emotional skills are an important leverage for promoting positive development, through their direct relation to skills in other domains such as cognitive and metacognitive abilities, and attitudes and values.

2.2.5　Measurability

77.　　As social and emotional promotion is coming to the forefront of traditional educational practices (with the proliferation of social and emotional learning standards and SEL curriculums designed for school-based settings), the development of reliable and valid measurement has paralleled. Some common formats of social and emotional assessments for measuring individual skill level are classroom observations, behavioral rating scales (self, teacher, and parent reports), and peer nominations (Tolan et al., 2016). Assessments commonly used in empirical research are the Social Skills Improvement System-Rating Scales (SSIS-RS; Gresham & Elliott, 1990), the Behavioral and Emotional Rating Scale (BERS; Epstein, 2004), and the Emotion Quotient Inventory (EQI; Bar-On, 2004). The SSIS-RS measures communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. The BERS measures interpersonal strengths, family involvement, intrapersonal strengths, school function, and affective strength. The EQi measures self-perception, interpersonal skills, decision making, self-

expression, and stress management. Measures of social and emotional functioning are used in practice as screening tools for intervention and also in research as predictors of important outcomes for youth. As this list of measures and scales might indicate, the framework utilizied and constructs included in SEL assessment is quite varied. This has posed a challenge in comparing across studies and findings. Additionally, some concepts are missing from measures. Compassion and mindfulness are particularly difficult to capture in a behavioral rating scale and much development is needed in this area.

2.3 *Physical and practical skills[3]*

2.3.1 *Practical skills: What are the practical skills[4]*

78. Practical skills are the capacities that are required to utilise and manipulate materials, tools and artefacts to achieve particular kinds of educational outcomes. The reference to practical skills is often associated with manual dexterity and craft skills, often based upon the use of hands (psychomotor capacities of an earlier time). Yet, practical skills have a far wider range of applications. For instance, many of the daily functions that we perform, e.g. getting dressed, practising hygiene, preparing food and feeding ourselves, engaging in written work, or using technologies of any kind or require practical skills of different kinds. So, it might be possible to distinguish i) practical skills for living, and also those for ii) working, with some significant overlap between the two categories.

79. It would seem likely that, whilst technologies change, the use of practical skills will inevitably evolve and be transformed but still be required. That is, in 2030 young people will still need a range of practical skills for their everyday life and working. For instance, the current use of smartphones and communicating by text is premised upon a set of practical skills that allow the user to create messages and send them using a small keypad.

80. Likely, practical skills can be of different kinds and calibres. There are specific procedural skills. These are particular sets of procedures which are used to perform particular tasks (e.g. tying shoe lace, peeling an onion, shelling an egg, placing addressing on a patient, performing a simple calculation). These kinds of activities are often learnt through observation, imitation and rehearsal, usually referred to as mimetic learning. One of the outcomes of frequent rehearsal is that these activities can be undertaken without engaging in conscious thought. This does not mean that these tasks are engaged with 'mindlessly'. However, through repeated practice these activities become single smooth procedures that replaces series of separate procedures (compilation of procedures) so that they can be enacted without requiring much conscious thought. That enactment is important because human cognitive capacity is limited. However, by reducing series of small procedures into one smoothly conducted procedure demands that in the way of engagement conscious memory. However, what does occur is monitoring of those actions, rather than deliberate conscious engagement with them. An outcome of frequent rehearsal is that these activities become tacit (being able to be enacted quickly and without conscious thought). This is a quality required of some kinds of human performance. For instance, musicians and sports persons are often able to enact music and perform physical activities in ways which do not require conscious engagement. If the musician or the football were to consciously consider all of their actions, they would need to reduce the pace of their activities because each one would be subject to conscious thought. Imagine if every step you took was subject to conscious movement of the legs, ankles and feet. Instead, these processes are highly rehearsed and we do not grant them much conscious thought unless we confronted by unstable surfaces (e.g. ice, rough surfaces)

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3 . Note: This section is drafted from the perspectives of art, music, and physical education.
4. Definitions and terminologies of this section are added in the Glossary as a working tool. See EDU/EDPC(2016)8/ANN1/REV1

81.   Whilst much of the consideration of practical skills might be associated with the use of hands, other parts of the body also can engage practical skills. For instance, feet are used to assist changing gears in cars, moderate the speed of a vehicle, engage in dancing, iceskating, climbing ladders and running. Moreover, this piece of text is been produced through the use of voice-activated software through which the author (myself) has to compose sentences, insert punctuation into the text, and sections. All of this is done with voice.

2.3.2   *Links to later outcomes*

82.   What are the educational purposes associated with developing practical skills? There are likely to be a range of educational purposes associated with practical skills. These might well be able to be divided into living skills and working skills. As noted, many of the living skills are likely to be those which, in different ways, humans will always need. That is, the ability to dress ourselves, dress others, prepare food and drinks, keep ourselves clean and hygienic, being able to communicate in a written form, and use contemporary technologies. The particular emphasis on practical skills and then warranting specific educational purposes and their need for educational interventions are likely to vary. For instance, being able to write any of the Asian character languages requires a level of precision and practical skill, which might be quite different from English. Whereas small changes in how individuals write words or letters might just lead to misunderstanding or spelling, infidelities in character languages can give the written form totally erroneous meanings.

83.   So, there are likely to be particular kinds of educational purposes which need to be developed for these young people's living skills, and then domain-specific kinds of practical skills associated with particular occupations for work and working life. The inevitable educational questions which of these should be the focus of intentional educational experiences.

Educational

- Children who study music and arts education subjects to a high level tend to achieve highly in all of their other subject areas

- Children who come live in disadvantaged circumstances can change their educational trajectory through involvement in high quality, ongoing music and arts programs

- Children who are experiencing issues with learning and behavioral disorders can moderate the impact of these disorders on their overall learning through ongoing involvement in tailored, high quality music and arts programs.

- Children who are involved in high quality ongoing music and arts programs tend to manage the demands of their education more effectively, through the effective regulation of their emotional states and ability to remain focused on their learning

- Children involved in music and arts programs tend to engage in less risk taking behaviour and experience less severe mental health issues than their peers, allowing the maintain a consistent approach to their education

84.   **Music and arts education** are learned through physical means. To both understand and demonstrate learning in arts education, children must experience them. To date, researchers have been unable to identify a comparable activity that develops the cognitive capacity of children in the same ways or to the same extent as music and arts education. This is due to the unprecedented connectivity that is required by the human brain to demonstrate the physical skills each arts discipline requires. In undertaking

the acquisition of physical skills in the arts, significant cognitive and meta-cognitive process must take place. Therefore arts education expresses itself through physical skills but is, at its core, a cognitive and meta-cognitive process.

85.   **Physical educators and policy makers** stress the need to identify learning conditions that enrich each child's physical, mental, social, and affective development (National Association for Sport and Physical Education and American Heart Association, 2012; World Health Organization, 2005). Considerable research has focused on the emergence of children's **abilities**, which are stable attributes that are primarily determined by genetics and reflect individual children's basic capacities to move and benefit from learning experiences. **Skills** are acquired through experience and training. **Motor skill** is developed in stages. An initial cognitive stage requires the novice learner to identify the movements required for a given task, the associative stage involves practice that is designed deliberately to improve movement efficiency, and the final autonomous stage reflects efficient adaptive behaviour (Fitts & Posner, 1967; Proctor, Reeve, & Weeks, 1990). The Power Law of Skill Acquisition (Newell & Rosenbloom, 1981) predicts that, regardless of the type of skill (i.e., cognitive, psychomotor and motor), performance is directly related to the amount of practice invested.

Motor skills

86.   Longitudinal research shows that the development of fundamental motor skills at preschool age predict cognitive efficiency and academic achievement (Roebers et al., 2014) when children transition to school (van der Fels et al., 2015). Recent research provides links motor coordination and skill competence to cognitive efficiency and academic achievement in children (Haapala, 2012; Haapala et al., 2014; Rigoli, Piek, Kane, & Oosterlaan, 2012b) and adolescents (Marchetti et al., 2015; Rigoli, Piek, Kane, & Oosterlaan, 2012a). These associations are consistent with neurodevelopmental research that reveals linkages among brain structures involved in controlled motor actions and executive functions (Diamond, 2012). A recent review provides additional support for the inter-relations among physical activity and motor-skill proficiency on children's cognitive function and academic achievement (Vazou, Pesce, Lakes, & Smiley-Oyen, 2016).

Workforce

- Children who study music and arts education to a high level in school continue further into formal higher education, resulting in a high general education level within the country

- Children who study music and arts education from disadvantaged background, who may tend towards higher levels of risk and criminal behaviour, are less inclined to do so. This result has been seen in disadvantaged areas in New York, Venezuela and Los Angeles where juvenile criminal behaviour has dropped dramatically due to the introduction of a music program

- Children who study music and arts education develop enhanced skills in self-regulation and emotional awareness resulting in less severe mental health outcomes and a readiness to ask for support. This further results in higher productivity in the workforce due to lowering the impact of mental health issues

87.   While fundamental movement skills emerge during childhood, skills can be enhanced by proper instruction and practice. Children with poorer movement skills are known to have greater challenges in developing skills in adolescence and adulthood (Robinson et al., 2015; Stodden & Goodway, 2007). As such, direct instructional methods that enhance the emergence of motor skills and general movement proficiency will prepare individuals who enter the work force (Lippman, 2015).

88.   Exercise and physical activity behaviours favorably alter brain development, components of physical fitness, and guard against the metabolic consequences of a sedentary lifestyle. Children who are overweight or obese early in life evidence higher incidence of health-related problems and lower academic performance later in childhood and adolescence (Martin et al., 2015; Martin et al., 2014; Reilly et al., 2003)

89.   Learning a new skill is both challenging and stress producing. Learning to cope with the stress of acquiring new skills is thought to result in a build-up of a physiological reserve that can shield against the negative consequences of stress (Dienstbier, 1989). The 19th Century beliefs that successful leaders in industry, military, and justice systems were trained on the playing fields of their youth remains valid today.

Physical development, Health and Wellbeing

- Adults who have studied music education in their youth have been found to have lower levels of cardio vascular disease and higher levels of brain health. With heart and dementia related diseases being two of the most impactful conditions on society and national expenditure, improvements in this area will enhance the wellbeing, productivity and relieve budgetary pressures on society

- Children who study music and arts education have better levels of immune and overall health with the addition of high regulatory skills for the emotional and mental states. This lowers the level of medical intervention required which benefits both the child and parent well-being and productivity to learn and work

90.   All arts disciplines include physical creation through physical skills. There is always a product, an art work in a permanent or ephemeral form, at the end of a creative learning process. This includes development of fine motor skills, gross motor skills, brain connectivity between motor, visual and verbal cortices and management of emotional states and performance nerves. The nature of the process and product cycle of arts education allows children to develop physically through moderate and sequenced challenges as they improve their physical skills.

91.   Research into the health and wellbeing benefits of the arts in extensive across arts education, arts appreciation and arts as therapy (both educationally and medically). A summary, which is by no means exhaustive, can be found below.

- Music listening has been found to assist in the regulation of heart rate variability (Trappe, 2010)

- In a summary by Hallam (2010) group singing can improve lung function, breathing, mood, reduce stress, bolster the immune system, physical relaxation and release of physical tension; emotional release and reduction of feelings of stress; a sense of happiness, positive mood, joy, elation, and feeling high; a sense of greater personal, emotional and physical well-being; an increased sense of arousal and energy; stimulation of cognitive capacities – attention, concentration, memory and learning; an increased sense of self-confidence and self-esteem.

- Music education interventions are now being used in the management of a wide spectrum of conditions including Autism (Lim, 2010), ADD and ADHD (Jackson, 2003), PTSD (Rickard, Wong & Velik, 2012), Alzheimer's disease and dementia (Witzke et al., 2008), trauma (Crenshaw, 2006) and the treatment of mental health issues (Rolvsjord, 2004). These therapies allow children to resume their education sooner and thus provide greater opportunity for them to contribute productively to society and live happier lives.

- Dance, as a physical pursuit, has been known to increase muscle strength and flexibility, improve range of motion and balance, improve coordination and posture, which can reduce back pain (Ward, 2008) which benefits the health of the community, contributing to a happier and more productive society.

Citizenship

- Students who have educational drama and theatre experiences are found to be more active citizens, show more of an interest in voting at any level, show more interest in public issues, show dedication towards their future and are more willing to participate in cultural activities or activities that respect and preserve heritage.

Other

- Arts education plays an integral role in the preservation and generation of cultural heritage in society. By studying past, present and emerging forms of art, children learn about the inherited traditions, folklore, language, knowledge and values that create a foundation for their world.

2.3.7 Issues related to Access & Equity

92.   A significant number of neuroscientific studies in music education that have examined the brain development of disadvantaged children when exposed to ongoing, sequential music education through a musical instrument. This is not a new field of inquiry but the addition of the neuroscientific methodology has enhanced the findings. When children living in disadvantaged circumstances are given access to ongoing music education programs have been found to significantly improve their literacy and language skills, auditory processing, executive function skills and social and emotional development (Kraus et al., 2014; Slater et al., 2015; Slater, Tierney & Kraus, 2013). These improvements in brain cognition also remain permanent to varying degrees throughout life, even when the children cease their formal music education (May, 2011). Arts education has had similar success addressing disadvantage in other disciplines. For example, Stevenson and Deasy (2005) found arts education to be the key reason for students' success in their study of 10 disadvantaged schools where students were excelling at externally measured educational outcomes.

93.   The transformative nature of the arts makes them powerful in addressing disadvantage. Arts programs have long been used to bring about positive change in places of hardship. Evaluations and systematic reviews consistently find improved physical and mental health and wellbeing (Djurichkovic, 2011), increased social inclusion and cohesion (Stickley & Hui, 2011) improvements in school retention and attitudes towards learning (Ewing, 2010), increased validation of, and connection to, culture (Ware, 2014); improved social and cognitive skills (Ho, Matthews & Mitchell, 2005); and some evidence of crime reduction or recidivism (Cheliotis & Jordanoska, 2014). The effects can also be indirect, for example, providing diversion or safe alternatives to risk taking, improving social status, as well as opportunities to build healthy relationships with community and culture. For indigenous peoples, the arts can provide some healing of hurts brought about by genocide or dispossession. Using traditional song, dance or artworks, coupled with ceremony, the arts can provide cultural continuity and cultural maintenance (Ware, 2014).

2.3.4   Links to other domains - underpinning practical skill fullness: What are these capacities linked to?

94.   Perhaps some of the greatest fallacies about practical skills is that they are not requiring effortful learning and are higher orders. While this might seem the case because highly skilled arts persons, sports persons and musicians are able to perform tasks seemingly without engaging in conscious memory, these

activities when being learnt, the enacted and being monitored or draw upon the human mind and higher orders of thinking. So, it is important not to see, as did the likes of Plato and Aristotle that people who use manual skills did so mindlessly and were not very bright themselves. Instead, what we know is that the development of these capacities requires a range of sensory, cognitive and dispositional qualities. So, although not observable, in the way that physical skills are, the capacities which underpin practical skills are beholden to higher forms of knowledge and knowing.

95.   Music and arts education have the greatest impact on the skills domain across all the sub-domains of cognitive and metacognitive, social and emotional and physical and practical skills. Research over the last decade has shown that music education in particular enhances these three sub-domains significantly. This is due to the large amount of research into the impact of music education on effective brain development. The cognitive efficiency developed through music education has the greatest impact on later life outcomes as it improves educational outcomes, earning capacity, emotional stability, physical health and ongoing brain health through life.

Knowledge

96.   Every arts discipline has a clearly defined set of disciplinary knowledge that has developed through centuries of human endeavour and development. Disciplinary knowledge, while specific to each arts discipline, is also strongly interdisciplinary across the arts disciplines. For example, rhythm and tempo can be explored in music, dance and drama. All arts have elements and several definitions crossover between disciplines. This interdisciplinary knowledge takes one step further in that artistic concepts and practices can apply beyond the specific arts discipline or the collective group of the arts and into unrelated areas of knowledge.

97.   The creative process of making a work of art, which includes a theory, multiple trials and unexpected outcomes, can easily be applied to a science experiment or the history a social movement. The greater the knowledge across disciplines and the ability to apply or contradict concepts from one disciplinary to another is fundamental to a deeper understanding of our world. The arts respond to social change and concerns, shifts in our societal and environmental values and the impact of local and global events.

98.   The physical skills in music and arts education are self-explanatory. However the tacitly acquired skills are the eminently transferable to the knowledge domain. The implicit understandings of social and non-verbal signals that come from highly developed social and emotional skills through the arts is a transferable skill. It can be utilised, often subconsciously, in every meeting, social event and conflict/resolution situation a child educated in the arts will encounter in adulthood.

99.   In summary, education in the arts is linked to the knowledge domain as a body of valuable disciplinary knowledge and the significant avenues for transferability to interdisciplinary and practical knowledge.

Cultural understanding

100.   Arts education around the world has an ancient lineage. Indigenous cultures worldwide have complex and diverse oral traditions that are essentially performative (Marshall, 2004). Within Indigenous populations, arts-based activities assisted in sustaining knowledge systems and perpetuating culture, ritual and tradition, experienced as part of people's identity and culture (Russell-Bowie, 2011a), taking place through a 'seamless web of painting, dance, music, storytelling and singing' (O'Toole et al., 2009, p. 31). Indigenous arts education policy constituted an integrated immersion model in which skills and knowledge

in music, dance, drama and art were passed down in the community (Mason, as cited in Russell-Bowie, 2011b).

Language development through music

101.   A large body of rigorous and validated research points to a strong connection between Music Education and language development. This line of inquiry emerged from the observation that musically training children tended to perform better in standardised tests on language (Caldwell & Vaughan 2011; Fitzpatrick, 2006), acquire language (Jentschke & Koelsch 2009) including words, syntax and prosody more effectively and earlier and utilise language more effectively (Patel, 2008). Research studies have now found that this is possibly due to the overlapping of brain regions recruited during music and language processing (Koelsch, 2006; Patel, 2003). Further research has found that Music Education trains the auditory processing network to make meaning from sound with greater accuracy and reliability (Kraus & White-Schwoch, 2016). Music Education has been found to have significant measurable impact on reading readiness (Tsang & Conrad, 2011) and reading skills (Tierney & Kraus, 2013). Research in the field of neuroscience and music has indicated that Dyslexia is primarily a disorder within the auditory processing network and that Music Education is an effect learning activity to correct this language processing disorder (Besson et al., 2007).

Numeracy through skills in music

102.   Currently there is a commonly held notion that **skills in music** and mathematics are closely related. This notion may have been born from anecdotal experience and social science research that found that students who learned music achieved higher academically in mathematics based areas of study (Geoghegan & Mitchelmore, 1996; Rafferty, 2003). Recent neuroscientific studies the findings of research exploring this connection have been mixed (Hallam, 2010). Students who have undertaken music education have been found to achieve better results in mathematics on a number of difference measures (Cheek & Smith, 1999; Whitehead, 2001) but the cognitive mechanisms that connect these two areas is yet to be identified. It is suggested in the research field at present that the overall improvement in cognitive functioning (Hallam, 2010) that music education has been found to generate is responsible for improved skills and outcomes in mathematics and not a direct overlap of brain regions as seen in music and language. A small number of similar studies have conducted across arts education and numeracy with similar findings that indicate arts education improves general intelligence, which transfers to numeracy learning (Hetland & Winner, 2004; Bamford, 2006).

Multi-literacies through drama

103.   There is a strong link between Drama and the development of multiliteracies, as drama and theatre activities provide students with opportunities to develop oral, written, multi-mediated, visual, kinaesthetic and aesthetic literacies (Dunn, 2005). Drama learning uses spoken, written and visual communications to enhance students' intellectual quality, connectedness, social support and recognition of differences (Martello, 2004). Dance and visual art similarly access multimodal literacies, as meaning is made through image, gesture, gaze, body posture and perspective. Multiliteracies using multimodal mediums mirror life more closely than learning that prioritises a single form of literacy, as everyday experiences are essentially multimodal with diverse representations of understandings (Kalantzis and Cope, 2008).

Multi-skills through wensorimotor intelligence (ability to think with body)

104.   Arts education develops high level cognitive skills essential for success in the new high technology, high-information and inclusive world of the future. It has been established that students

participating in arts learning enhance their <u>creative thinking skills, problem solving abilities, self-expression, risk taking and cooperative aptitudes</u> (Jensen, 2001). As an integral part of the educational process, the arts facilitate students' <u>cognitive, affective, kinaesthetic, and aesthetic development</u>. The arts use physical and embodied ways of learning, and often <u>the body is a principal tool for demonstrating skills, knowledge, understanding and ideas.</u> The power of movement and embodied learning has been well-documented in educational theory. Piaget (1951) described sensorimotor intelligence as the ability to think with the body. Dance, in particular, offers the opportunity to think using the body, facilitating a union between bodily-kinaesthetic understanding and thinking, feeling, and doing (Wright 2000). This, in turn, enables a freedom of expression in literacy beyond words.

105.   Aesthetic learning is able to be readily cultivated through arts education, which is centred on imagination and growth, and the learner can be <u>open to wide possibilities and divergent thinking</u> (Greene, 1999). Evidence of aesthetic engagement can be found when there is a sense that 'composition' has taken place (Misson & Morgan, 2006). When students engage aesthetically, they i) <u>analyse aesthetic elements; (ii) develop personal and critical response through judgement and evaluative tools; (iii) appreciate different cultures, values and contexts; (iv) understand disciplinary perspectives that inform the aesthetic; (v) actively pursue aesthetic engagement; and (vi) possess the ability to articulate aesthetic processes</u> (Gale, 2005). These outcomes have clear learning processes embedded in them. Through these learning processes, aesthetic learning can be accessed in classrooms from the early learning to senior years. Aesthetic learning enables students to experience the transformative power of education, share their insights with others, take risks, develop self-esteem and self-worth, and develop respect for others.

106.   The interrelationship between the constructs is extremely strong within music and arts education. Arts making is a practical skill, however to order to create a completed artwork, whether it is a musical or dance performance, play a character in a play or exhibit a painting, children need to have mastered an array of skills internally.

<u>Multi-skills through playing a musical instrument</u>

107.   The connection between cognitive development and music education has been notably strong during the last two decades. This is due to the revelation in the late 1990s that music stimuli and consequently studying the brain structures and functions of musicians was a powerful vehicle to advance our understanding of the human brain (Zatorre, 2005). In numerous longitudinal comparative research studies, adults and children who have participated in many different types of music education programs have been found to have enhanced brain structures and functions to non-musicians (Schlaug et al., 2005;.Neville et al. 2008; Hyde et al., 2009). These studies have been conducted using a variety of participants groups; professional and amateur adults musicians to children aged from infants through to high school students. The mode, length, methodology and instrument group has also been varied across these studies and yet similar results have been found. The physical skill of learning music through a musical instrument that is age appropriate (small drums for infants through to orchestral instruments for teenagers) and uses age appropriate methodology (use of integrated sound and movement such as the Kodaly and Orff methodology for younger children as well as disciplined, scaffold methods for older musicians to develop mastery and expertise) results in enhance brain structures and functions.

108.   To summarise the enhancements, music education trains the brain to use less rather than more activity to <u>complete a given task</u> (Münte, Altenmüller & Jäncke, 2002), the hemispheres of the brain have faster and more effective connectivity (Steele et al., 2013), brain synapses are faster (Schlaug, 2001), connectivity between brain structures such as the auditory, motor and visual corticies is enhanced (Gaser & Schlaug, 2003), <u>improves executive function skills including planning, attention, focus, strategizing</u> (Moreno et al., 2011), higher levels of brain plasticity that impacts on learning capacity and <u>long term brain health</u> (Moreno et al., 2009), improved <u>spatial awareness and non-verbal skills</u> (Forgeard et al.,

2008), enhances the processing of external emotional meaning (Hannon & Trainor, 2007) and internal emotional regulation and control (Koelsch, 2010) is improved and general health and wellbeing is improved over the life span (Wan & Schlaug, 2010; White-Schwoch, 2013).

109.	Using a music performance as an example, in order to reach the point where a practical skill can be exhibited, children need be able to;

- Interpret the music symbol system from a text based concept to an auditory concept through a musical instrument (cognitive)

- Complete sometimes months of disciplines individual practice in which they have had to remain self-aware of their own learning strategies, rate of learning and practices that may impede their progress (meta-cognitive)

- Remain engaged with their music ensemble and/or their instrumental teacher in a relationship based on trust and intellectual engagement (social)

- Moderate and regulate their emotional state and remain focused on completing the task (performance) over both a long period of time and in the face of setbacks and stagnation (emotional)

- Maintain the ongoing development of the physical dexterity and fine motor skills required to control their bodies in order to produce the sounds they want to when they want to during the performance, taking into account the affect of performance nerves (emotional and physical)

110.	Children's levels of physical fitness are co-determined by genetics, physical activity, and training (Malina, Bouchard, & Bar-Or, 2004; Schutte, Nederend, Hudziak, Bartels, & deGeus, 2016). While children's levels of aerobic physical fitness are difficult to alter compare to those of adults, the emergence of children's fundamental motor skills can be enhanced considerably via physical activity and instruction. Motor skill competence is considered critical for achieving physical literacy (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2008). Individuals who do not master fundamental motor skills in childhood are less likely to participate in organized sports, recreation, and health-related physical activity; as such it is a relevant public health factor (Iivoven & Saakslahti, 2014; Robinson et al., 2015). For children, fundamental motor skills emerge in teaching environments that encourage and shape complex motor and cognitive skill. The process of learning skills spurs children's cognitive development, self-concept, and socialization (Tomporowski, McCullick, & Pesce, 2015).

Social and emotional development skills

111.	Research in the area of social and personal development and arts education has generally been undertaken using self-reporting mechanisms. This is aligned with social and personal development research across many fields. Arts Education has a long and well developed research record of enhancing social and personal development in children (Hallam & Prince, 2000; Hanshumaker, 1980; Karkou & Glasman, 2004; Whitwell, 1977). Due to the collaborative nature of arts making, particularly in the performing arts (Music, Drama, Dance and Theatre), high levels of social and personal awareness are essential for any artwork to come to fruition. This it is a natural and complementary experience for all children to have to develop intra and inter social and personal skills. Arts education facilitates the development of self-esteem, encourages thinking and reflection, and develops perseverance and self-regulation and resilience (Ho, Matthews & Mitchell, 2005).

112.   Neuroscientific research has added a new perspective on the impact of music learning experiences on social and personal development. The activities investigated in the research span from listening to music through to music learning to a variety of different levels and different ages. In the majority of studies music listening and learning have identified the benefits of such activities on both the emotional and cognitive domains of human experience and development. Similar studies have found comparable results across all arts education disciplines.

113.   A significant field of study has been with babies and how music assists babies to develop the foundations of communications skills, which leads to early and positive development of relationships with parents and carers (Gerry, Unrau & Trainor, 2012). This research has extended into toddlers and young children to high school students (Kraus & White-Schwoch, 2016), finding that music education impacts of social and personal beliefs which simultaneously improving brain connectivity which impacts of cognitive capacity. Music listening and education have been found to have a significant positive impact on adolescent wellbeing and mood regulation (Saarikallio & Erkkilä, 2007). The original study that the Mozart Effect was based upon (Rauscher, Shaw & Ky, 1993) found that in the given experiment it was not the type of music that improved the participants cognitive performance but the affect of music as a mood enhancer prior to completing the test (Ivanov & Geake, 2003).

114.   Longitudinal research shows that the development of fundamental motor skills at preschool age predict social and emotional development (Bart, Hajami, & Bar-Haim, 2007; Piek, Bradbury, Elsley, & Tate, 2008). Ongoing explicit learning experiences in the arts develop a nuanced and finely tuned understanding of the social and emotional domain. To advance beyond even the rudimentary skill acquisition stages of all arts disciplines, children must begin to engage with the social aspects of arts making and understand and articulate emotionally response to their own art and art made by others. Arts making experiences, particularly in the performing arts of drama, dance and music, are inherently social in nature as they are the creation if art works as a group of team. The arts are often seen as vehicles for self-expression and creativity and are unique to human beings. This is because they express the complex nexus between human thought and emotion.

115.   Music education research over the last decade has focused heavily on the link between music education and executive functions skills in children. Executive function skills are a suite of skills that helps us regulate our logical and emotional responses. These skills are now understood to be the basis of many cognitive and behavioural disorders children exhibit in childhood (Blakemore & Choudhury, 2006). Underdevelopment of executive functions skills has also been found to have a significant impact on a child's ability to contribute productively to society in adulthood (Biederman et al., 2004). Music education has been found to hone children's attention skills (Degé, Kubicek & Schwarzer, 2011), enhance inhibition control systems (Bialystok & DePape, 2009), extend working memory (Bugos, 2007), enhance planning and strategy skills (Schellenberg, 2011), interpret emotions in a social setting (Lima & Castro, 2011) and exhibit a high level of emotional understanding of both themselves and others (Schellenberg, 2011).

116.   The final point is worth drawing out. Musically trained children have been found to have higher levels of tolerance across emotional, behavioural and cognitive domains. The act of learning music, which is a slow and incremental process of developing skill and musicality simultaneous, is thought to develop this higher level of tolerance for ambiguity, differences of opinion and interpretation as well as fluidity of the creative and learning process. The DICE project similarly found that students who engaged in drama and theatre experiences had greater capacity to change their perspective, displayed more tolerance towards minorities and foreigners, were more active citizens and felt better at home than those who had not (Eriksson, Heggstad, Heggstad, & Cziboly, 2014). These qualities transfer into the ability to seek out diversity, appreciate the complexity and nuance of a given concept or point of view and find connections between diverse and initially unrelated ideas. This concept extends across all arts education disciplines and

is thought to contribute to the quality and flexibility of artistically training adults in their chosen fields of work.

Transferable skills through arts education

117.   Arts education provides every child with the transferable skills to deal with the world they will be contributing to in adulthood with the increasingly important skills of cognitive flexibility and emotional stability. Significant strides have been made over the last two decades of the transferability of learning, skills and knowledge from the arts to other areas of learning and development. This is due to the advancement in technologies that can now show us how the brain of a child develops through involvement in the arts. Similarly, new technologies and the rapid advancement of our ability to share resources in a truly global way have changed the way children interact with the world on a daily basis. Ultimately this is due to the significant changes in the global landscape of education and our political, humanitarian and environmental climates. Meaningful educational experiences in the arts never been more vital to a child's educational development to allow them engage with the world in a productive way in 2030.

Attitudes development

118.   Music and arts education has been shown to develop and moderate the development of attitudes in children. Appreciation on ambiguity, interpretation and the results of consistent work and dedication are just a few areas where music and arts education help children develop positive attitudes. The following are examples of ways that the physical skill used in arts education facilitate the development of dispositions and mindsets connected to the Attitudes domain.

119.   All performing arts require arts making in teams, which requires high levels of social awareness and communication. This requires a social approach as well as assertiveness and enthusiasm in social settings. Neuroscientific research has found that physical involvement in the arts activates the reward network in the brain. This network is the brain's personal happy hormone centre and provides a neurological enthusiasm for all types of learning. Listening and making music allows children to access and manage a greater number of personal emotions, encouraging compassion, respect and trust. This process assists children to develop higher levels of empathy for others as they understand and can recognize the emotional states of other. Self-discipline, organization, responsibility, goal orientation and task initiation are all executive function skills that children in the arts need to master for both socially constructed and individual reasons. The high stakes, performance nature of the arts provides a compelling incentive for children to mastery these attitudes. The subjective nature of the arts provides a unique environment for the development curiosity, creative imagination, aesthetic interests, self-reflection and autonomy. The opened ended nature of many arts activities, the fostering of divergent thinking, and the high level of self-creation allows children to explore both their own creativity, aesthetics and autonomy, it allows them to understand and respect the same attitudes in others. Particularly in the performing arts, consistent experience of performances as a performer and an audience member provides the ideal experience to both experience stress and seek out personal sources of confidence and control. This encourages the development of attitude development including stress resistance, self-confidence, emotional control, self-esteem.

Values development

120.   Music and Arts education allows children to triumph over adversity and disadvantage, providing more opportunities for equality to be achieved through education. The opportunity to use imagination, create original works and think independently enhances the freedom of the individual in a way that allows them to craft their own identity. A sense of justice is developed for the individual through artistic pursuits.

Artistic endeavours can take the form of <u>activism, self-expression and demonstration of struggle</u>, as children <u>tell their own stories of their worlds and they worlds they wish to inhabit</u>.

121.   The arts enhance the well-being of all citizens. In recent times, moves have been made to ensure that all can access the arts, regardless of gender, race, disadvantage or disability. The arts allow citizens to stand together, as collaborators and audience members, to <u>create or experience the aesthetic qualities of the world.</u> The experience of belonging to an artistic ensemble, arts collective or audience facilitates solidarity, particularly when personal stories are used to develop empathy and compassion. The arts allow children and adults to see the world from others' perspectives and engage with stories outside of their own experiences. The arts have the ability to bring people together to share stories and increase intercultural understanding, thereby promoting the peace and security of our world. The arts need not be resource intensive and can be taught in environmentally and socially responsible ways. The arts improve the individual's sense of responsibility in the world, as well as active and responsible citizenship.

2.3.5   Implications for malleability - Educational processes developing practical skills: How are these capacities best developed?

122.   It would seem that there are at least two sets of processes through which procedural capacities such as practical skills can be developed. What cognitive scientists suggest is that there is a movement from concepts into procedures (Anderson 1992). That is, a person might be aware of the concept of writing, which is a necessary precondition for them to engage in process of writing. Then, through efforts to utilise those concepts and through modelling the individual and acts increasingly mature approximations of what they have seen modelled. This then leads from concept through to the development of hope and procedures through practice. In this situation, there is need to identify what practical skills need to be learnt and then provide students with the foundational concepts, and then the opportunities for using their bodies, particularly hands to reproduce what is understood about but cannot be practised.

123.   The other view is that practical skills or procedural capacities come from doing things and that the conceptual platform is not necessary. For instance, somebody coming to learn to ride a bike does not necessarily need the concept of gravity and balance, but a sense of inertia and the ability to balance the progress of the bike. Part of the issue here is that these kinds of capacities are very difficult to articulate: speak or write down. So, there are likely to be a range of particular kinds of learning which may best progress by placing the learner to experience, reproduce and engage in those important approximations through practice, but not preceded by conceptual premises. So, learning to swim, using a keyboard or touchpad, does not require the learner to understand aquatic principles, how a keyboards work and touch keyboards operate. Instead, it is a question of engaging with these activities and developing practical skills through links and practice.

124.   Skill development and level of expertise, regardless of type, depends on the interrelation between learner and teacher. Physical education is an intervention designed to promote **physical literacy,** which reflects the kinesthetic knowledge required to move with competence in a wide variety of physical activities. Rate of skill development requires an individual to have adequate basic abilities and sufficient level of motivation (i.e., **physical energetics**); it also requires a teacher who employs adequate instructional methods and manipulates the specific context of training can environmental factors. The transmission of information from teacher to learner by means of instruction, guidance, and feedback is the critical

125.   Music and arts education are learned through a lengthy process of physical skill development, conceptual understanding and process refinement. Physical skill in any arts discipline is a highly malleable process, meaning it is developed through process of learning. However progress and demonstration of skills in any arts discipline is hindered by the concept of innate artistic talent. Neuroscientific researchers

have worked to unravel the connection between nature and nurture in the area of music education and explore how genes or family influence may play a part. The findings at this point in time point to a broader concept of predispositions at birth for all types of cognitive, emotional and physical skills, which can then be either cultivated or inhibited by the type of experiences each child is exposed to.

126.   An example in music education is that all human beings are born 'musical'. It is now known that the music and language regions of the brain overlap. Babies use music to decode language when they are first born (Perani et al., 2010) and continue to use their music processing networks to learn how to speak and communicate (Kraus & White-Schwoch, 2016) and finally to master reading (Corrigall & Trainor, 2011). Therefore we are all born with the ability to play a musical instrument because we have the cognitive and auditory processing skills to apply to the physical skill of learning to produce music through an instrument. We may be physically suited to different types of instruments and may aurally prefer some types of sounds other types. The most impactful contributing factor to progress on a musical instrument, either as a beginner or expert, is disciplined, sequential, engaged practise.

127.   For this practise to be effective in progress a child or adult in successfully progressing on a musical instrument, children need to learning both musical skills and non-musical skills. The most impactful of the non-musical skills is the suite of skills known as executive functions – the ability to pay attention, remained focused, plan effectively, manage time and effort efficiently and regulate their emotional state in the face of success and challenge. These are highly transferable skills to all aspects of later life and also transferable across all arts disciplines.

2.3.6   Implications for measurability - Assessing practical skills: How these capacities best assessed? Can artistic pursuits be measured?

128.   A key quality of competent practical skills is that the person using the is able to engage in other activities whilst using their practical skills. Hence, the musician is able to sing whilst playing the guitar/keyboard/etc; the car driver can change gears and communicate and talk with passengers at the same time, because they do not require conscious engagement with and acting practical skills. So, for instance it somebody cannot conduct a separate conversation whilst demonstrating a specific practical skill, they had not developed it to the level whereby it makes little or no demands upon conscious memory. Quite simply, it somebody cannot perform a skilled activity whilst at the same time talking (e.g. giving an account of what they are doing) there are probably not highly developed in their skill fullness.

129.   With the advent of new technologies, research studies within the field of **arts education and learning** have shifted significantly over the last decade. The ability to measure brain activity in real time, in greater depth than ever before and outside the clinical environment have all contributed to a wealth of new knowledge about the impact of arts education on human development. The fields of science and social science research have never been as closely aligned as they are now due these technological advances.

130.   The scientific research design that has been utilised predominantly is the randomised control-experiment group with pre-test/post-test design. In neuroscientific research studies using musical training to understand brain function this design would have two groups labelled musicians and non-musicians who would undergo a test of neurological function prior to an intervention, the musician group would undergo an intervention of a type of music training for anything between six weeks to three years. Depending on a length of the intervention, a post-test neurological function test or periodic neurological function tests would be undertaken to track brain changes. This model has been used across other arts disciplines with varying degrees of success. This variability is as much to do with the need for reliable mobile technology as it is for the experiential nature of arts education and the impact of multiple external factors (socio-economic status, parental education) on the research design and data analysis.

131.	Specifically in the field of **music education and intelligence**, numerous intelligence measures have been used to investigate the impact of music education on general intelligence. A seminal research study by Schellenberg (2004) found that music education enhanced students IQ after two years of music learning by an average of 7.5 points for an average student. Similar studies have found that music education impacts on the following types of intelligence; spatial intelligence (Moreno et al., 2011); verbal intelligence (Ho, Cheung & Chan, 2003), visual intelligence (Schlaug, Norton, Overy & Winner, 2005); emotional intelligence (Schellenberg, 2011) and problem solving (Moreno et al., 2011).

132.	While the measurement of these definable intelligences is valuable to informing educational policies and curriculum, it is the interaction of these intelligences that provides the most powerful impact of arts education on a child's development. One of the reasons why studying the impact of arts on a child's development is so difficult and resistant to the scientific method of research is it is both so intrinsically interlinked and difficult to quantifiable. Unfortunately these two factors lead to an impression that arts education is a less valuable or softer area of study. In fact, neuroscientists around the world are challenging this impression vigorously and with new technologies we are beginning to see quantifiable measures of the impact of arts education on brain development in children. One of the most exciting elements of this development is that these changes are both positive in children and have far reaching implication for brain, emotional, economic, physical and mental health for the period of a child's life, not just their childhood years.

133.	Measurement of **arts skills** is most often accomplished by assessing, both objectively and subjectively, the final artwork, and not the process of creating the art work where the powerful and impactful learning occurs. It is possible that the final art work does not meet the criteria of a 'good' or 'successful' work of art. However the process that the child went through to create that work may have been deeply impactful. It could have allow the child to learn about intellectual risk taking, emotional regulation and influence on creativity, management of feedback and perceived failure or responding to a new arts medium. These are all extremely valuable and impactful experience that allow a child to develop into an adult who is flexible in their thinking, responsive to conceptual and social change, willing to take intellectual and emotional risks and can remain on task even when the outcome is distant and the quality of it unknown.

134.	The brain development enhancements are of particular interest when it comes to measures of different intelligences. The inclusion of high quality, meaningful and ongoing **arts education** in each child's educational experience has been researched extensively (Ellen & Stéphan, 2013). The Dana Consortium (Ashbury et.al.) conducted a meta-analysis of arts research in the area of intelligence and found that engagement in arts activities improves a child's attention, which in turn can improve their cognition (Posner & Patoine 2010). The arts develop students' empathic intelligence (Davis 2008), which enhances their connectivity, emotional engagement sense of identification with and responsibility for others. In studies of visual arts environments the arts develop 'studio habits of mind' which enable them to engage, persist, commit to a project and follow through with a task (Hetland and Winner, 2007). These skills, used in conjunction with divergent thinking, are rarely developed elsewhere in the school curriculum. Hetland and Winner also found the arts teach students to "envision", that is, think about that which they can't see. These skills is transferable to other areas, such as developing hypothesis or imagining past events or future predictions. The intelligences developed through the arts have positive impacts on students external measures of success, for example Walker, Tabone and Weltse's (2011) US study found that students who received an integrated arts curriculum were 77% more likely to complete their state external assessment with a passing score.

135.	Arts education requires a particular style of measurement and here is much literature that attests to the impact and outcomes of creative work being be measured with a high degree of integrity (Colwell, 2003; de la Harpe, Peterson, Frankham, Zehner, Neale & Musgrave, 2009; Fleming, 2012; Pistone, 2000;

Willoughby, Feifs, Baenen & Grimes, 1995). The perceived subjective nature of music and arts education make measurability in the form of a comparative numerical value on a scale appear difficult. A wide range of responses are plausible to a particular task. Measurement in the arts is highly dependent on a wide range of interrelated contributions (Cockett, 1998). For example, performance assessments are complex because of the variations between performance sites, the requirement for ensemble or group work, the nature of the ensemble or group, the access to technical equipment and the composition and reactions of any audience that might be in attendance (Oreck, Owen & Baum, 2003). Arts education curriculums across all OECD countries have clearly defined measures of achievement on comparative scales in all arts disciplines. These scales include technical skills and artistic interpretation descriptors that are used by highly trained and experienced arts educators.

136.   In summary, there is a perception that the quality and relative merit of an artwork is entirely subjective and therefore measurability of achievement in the arts is also subjective. In fact the opposite is true, objective assessments of all arts mediums across all arts disciplines have been achieved by national education curriculums across the OECD countries. The next frontier for measurability of the impact of arts education into later life is the broader impact of the arts on the human development and productivity.

137.   This portion of the overall curriculum project seeks to consider the educational purposes for and processes that might be used to develop practical skills for students who would be 15 in the year 2030.

2.3.7   Key findings

- **Children's physical fitness can be enhanced via physical literacy instruction**. The components of physical fitness (cardiorespiratory function, muscular strength, muscular endurance, and flexibility) are differentially affected by training interventions (Malina et al., 2004). Training does improve children **muscular strength** and muscular endurance, but to a lesser degree than adults. Improvements in children's muscular strength and endurance is explained primarily by neuro-muscular integration that reflects motor skill development as opposed to changes in skeletal muscle morphology (Brooks, Fahey, & White, 1996, Chp 20).

- **Children's cognitive fitness can be enhanced through learning in the music and the arts.** Improvements in general academic achievement can be strongly connected with a child's involvement in high quality, ongoing learning experiences in music and arts education. Research has quantified this benefits across multiple measures of achievement and intelligence.

- **There is an ongoing secular decline in children's physical fitness and fundamental motor skills**. Longitudinal studies show that trends of inactivity have an early onset at pediatric age (Telama, 2009), with children not meeting the recommended physical activity guidelines at preschool age (Tucker, 2008). Secular trends of decreased levels of physical activity have been accompanied by declines in physical fitness (Runhaar et al., 2010; Tomkinson & Olds, 2007). Likewise, as early as preschool age, motor fitness measured in terms of motor coordination and fundamental motor skills have shown secular decline (Roth et al., 2010). While often thought less relevant for health, motor skill competence is critical for meeting physical activity recommendations later in life (Barnett et al., 2008; Stodden et al., 2008), since persons who have not mastered fundamental motor skills in childhood are more likely to refrain from participating in organized sports and physical activity. Motor coordination skills are a relevant public health factor (Iivoven & Saakslahti, 2014; Robinson et al., 2015).

- **Scientific methods have enhanced our understanding of the impact of music and arts education.** Science (particularly neuroscientific) and social science research methods continue to find that arts education has multiple artistic and transferable skills that are beneficial for

cognitive, emotional, social and physical development of children. Research into the transferability of the skills within arts education has resulted in enhanced understanding and measurability over the last two decades

- **Children's fundamental motor skill are enhanced via physical literacy instruction**. Historically, the role of physical education teachers has been to teach children the movement skills that are necessary to engage in later sport, recreation, leisure, and everyday activities that promote **physical literacy** (National Association for Sport and Physical Education, 2011). Over the past few decades, research has revealed the benefits of aerobic exercise on children's physical and mental health, cognition, and academic achievement. Emerging from these studies is the Exercise is Medicine® (EIM) global health initiative managed by the American College of Sports Medicine (ACSM) (Exercise is medicine, 2016). EIM focuses on encouraging primary care physicians and other health care providers to include physical activity when designing treatment plans for patients and referring their patients to EIM Credentialed Exercise Programs and Exercise Professionals. EIM is committed to the belief that physical activity is integral in the prevention and treatments of diseases and should be regularly assessed and "treated" as part of all healthcare.

- The proponents of the EIM have greatly impacted how contemporary physical educators, parents, and policy makers view interventions designed to improve peoples' lives. Quantitative interventions are characterized as those requiring minimal skill, involving repetitive movements controlled with negligible attentional control (e.g., treadmill running, ergometer cycling, or calisthenics), and whose intervention fidelity is based primarily on indices of cardiorespiratory function (e.g., heart rate, oxygen uptake, or accelerometry). Qualitative interventions are characterized as those involving exercise with high cognitive effort and/or skill learning (e.g., exergames, multi-limb coordination games, or strategy/learning games), and whose intervention fidelity is based on indices of mental engagement (e.g., observational methods, self-report). Mental engagement is behaviour reflecting thoughtfulness and exertion of effort required to comprehend new information and to master new skills (Tomporowski, McCullick, Pendleton, & Pesce, 2015).

- **Children benefit from both quantitative and qualitative physical activity interventions.** Aerobic activities promote physical health and fitness and offset the detrimental effects of a sedentary lifestyle (e.g., weight gain) and skill-based activities promote the acquisition of knowledge that underlies physical literacy. While intervention programs that blend aerobic and skills training are ideal, it is important to remember that quantitative interventions designed for adult fitness training are not well suited for children, whose physical activity patterns differ greatly from those of adults (Welk, Corbin, & Dale, 2000). Interventions that resemble play, games, and sport that are developmentally appropriate provide children opportunities to master physical and cognitive skills and learn to control thoughts and actions (Tomporowski, McCullick, & Pesce, 2015).

- **Music and Arts Education have an impact on latter life outcomes.** The impact of high quality, ongoing learning experiences in music and arts education can be measured into adulthood in the areas of economic productivity, further education, high levels of social awareness, improved management of emotional states and improved physical/cognitive health. All children, regardless of perceived innate talent in a given art form, can excel in any or all arts discipline areas when provided with access to quality learning experiences, quality teaching and appropriate music and arts resources. Research into the impacts of music and arts education supports the anecdotal evidence that children involved in music and arts education programs are capable of surpassing the restrictions of their socio-economic backgrounds. Aesthetic awareness is developed through

engagement with arts making, presenting and responding activities. These engagements are academically rigorous, facilitating the development of personal and critical responses to aspects of the human condition through judgement and evaluative tools. Arts education enables connection with community, active participation in society, connectedness within schools, families and peer groups and contributions to the heritage and ongoing cultural development of their society

- **Physical literacy instruction: Procedural vs. Declarative knowledge.** There is compelling evidence that novice learners acquire two forms of knowledge that provide the basis for physical skill. **Procedural knowledge** reflects changes in understanding how to act; that is, the selection, sequencing, and timing of muscular actions (R. A. Schmidt & Lee, 2011). Through instruction and practice, physical skills emerge based on changes at the level of individual muscle fibers, the spine, and higher centers of the brain (Chin, 2010). Some aspects of physical skills are acquired without conscious awareness. Other aspects of physical skill acquisition require attention-to-task and mental engagement and lead to memories that constitute **declarative knowledge,** which reflects changes in cognitive skills that are used to direct movements and anticipate their consequences (Schneider, 2015). Considerable neuropsychological evidence provides the basis for these two forms of memory storage and learning (Morris, 2013). Useful and adaptive behaviour requires the synthesis of procedural skills and cognitive skills.

- **Instructional Methods: Direct Instruction vs. Discovery**. Pedagogical approaches to skill learning reflect teacher's attempts to synthesize procedural skill and declarative skill development. The **direct instructional method** views that the teacher's role is to prescribe the selection of specific movements that are to be taken by the novice. As many games and sports require specific actions the teacher or coach focuses on the development and refinement of specific movement patterns (Metzler, 2011). The **discovery method** views the teacher as a facilitator who arranges a game context and allows the novice to explore various ways to move (Scibinetti, Tocci, & Pesce, 2011). Proponents of the discovery method tend to focus on young children and the development of fundamental movements skills via the use of children's imagination and play; whereas, proponents of the direct instructional method focus on children and adolescents who are acquiring sport-related skills.

- **Learning and retention: The role of contextual interference.** Proponents of qualitative physical activity interventions contend that movement activities that include components of mental engagement provide children with cognitive benefits that are not obtained from quantitative exercise interventions (Cairney, Bedard, Dudley, & Kriellaars, 2016). The rationale for the additive cognitive effects derived from mental engagement is based primarily on the contextual-interference effect hypothesis. The **contextual-interference hypothesis** explains how and why alterations in instructional context during initial practice sessions benefit skill retention and transfer of learning to novel tasks. Numerous studies of motor learning have shown learning to be more robust when training occurred under conditions that varied from trial to trial than when conditions remained fixed and predictable (Guadagnoli & Lee, 2004; Tomporowski, McCullick, & Horvat, 2010). Explanations for the facilitating effects of varied practice on learning have focused on the amount of mental involvement required of the individual during practice. Under varied practice conditions, every change in successive practice trials requires the individual to inhibit previously used movement action plans and to call into action a different movement plan. Successfully shifting movement action plans from one task to another involves multiple mental operations. The individual must recognize the environmental conditions that define the task, retrieve a movement program from long-term procedural memory, and apply movement parameters to actions that are planned to perform the task. Educators who employ

methods that vary task conditions and goals elicit children's mentally effort and result in durable skill learning (Tomporowski et al., 2010).

- **Learning and retention: The role of exercise-induced arousal**. Interests in the specificity of exercise training have been spurred by data obtained from studies that demonstrate distinct differences in the manner in which the brain responds to specific forms of physical activity. The neural networks that are developed following repetitive, mindless, and unskilled behaviours differ from those that are developed following the learning and practice of a new skill or sport (Carey, Bhatt, & Nagpal, 2005; Will, Galani, Kelche, & Rosenzweig, 2004). Several researchers have noted that the direct effects of exercise potentiate children's skill acquisition (Etnier, Labban, Piepmeier, Davis, & Henning, 2014; Pesce, Crova, Cereatti, Casella, & Bellucci, 2009). Physical activity primes and prepares the brain to benefit from environmental experiences and skill learning (Roig et al., 2016). Neuropsychological research provides evidence that physical activity experiences performed early in life contribute to the growth of brain neurons in areas critical for memory. The hippocampal reserve hypothesis (Kempermann et al., 2010) suggests that increases in the number of brain cells could potentially influence an individual's capacity to respond adaptively to challenges that are encounter across the lifespan.

- **Learning and retention: The role of Play and Games. Play** is a form of physical activity that serves an important role in normal maturation and in the emergence of children's cognitive processes (Hughes, 2010) and socialization (Pellis & Pellis, 2007). Restrictive environments which limit children's access to time for free play, rough and tumble play, and physical activity impede socially appropriate behavioral patterns (Diamond, Barnett, Thomas, & Munro, 2007). Children's brain development benefits from exploratory play and physical activity games. Neural networks, which are relatively undifferentiated at birth, become increasingly more specialized during childhood (Casey, Galvan, & Hare, 2005). The pattern of children's neural specialization is determined, in part, by environmental stimulation (Kolb & Whishaw, 1998). Through play and games children learn to decide when it is appropriate to act and when an action should be inhibited. Inhibition skills have been viewed as a cornerstone of behavioral control (Diamond, 2013). Children who are motorically active gain more from their experiences and acquire greater behavioral control than children who are less motorically active (Campbell, Eaton, & McKeen, 2002). Play that necessitates effortful mental involvement influences children's ability to control their movements and self-regulate their actions. Environments requiring only repetitive actions with minimal mental involvement may foster infants and children who exhibit passive, reactive behaviours that do little to promote the advancement of cognitive or movement skills (Blair, 2002).

- **Learning and Retention: Effects of Action-perception coupling.** Proponents of **embodied cognition** hold that cognitive processes are deeply rooted in the body's interactions with the world. Research on infants' acquisition of movement skills reveals an interrelation among physical activity, mental effort, and cognitive development (Thelen, 1996). As infants move, they learn about their environments and how tasks are solved (Adolph, 2008). Sensorimotor activation has been shown to influence both reasoning and problem-solving in later life (Gallese, Rochat, Cossu, & Sinigaglia, 2009). Likewise, classroom activities that blend physical activity with academic teaching have shown enhanced children's academic performance (Donnelly et al., 2013), suggesting that movement based instruction leads to superior encoding and ability to recall academic information (Moreau, 2015).

- **Interactive relations among Motor Skills, Aerobic Exercise, and Mentally Engaging Physical Activity: Key Studies.** A recent large-scale intervention addressed this relationship (Pesce et al., 2016). Supported by the Ferrero Group as part of its Corporate Social Responsibility

initiatives to promote active lifestyles among young people, over 900 children of the municipality of Alba, Italy participated in the study. Children who received an enriched physical education intervention that emphasized mentally engaging activities showed alterations in motor skill proficiency, cognitive function, and physical fitness not seen in children who received standard physical education instruction. Increased in executive function were due partly to increased motor skill improvement. In addition, improvements in children's motor skills led to increased participation in sport and self-initiated physical activity outside the school setting. Identification of children with poor motor performance and comprehensive physical activity targeted to increase both physical fitness and motor skills may have the potential to positively affect executive functions and academic performance (Haapala et al., 2014).

Section III: Preliminary Construct Analysis in the Values & Attitudes Domain

3.1   Attitudes

3.1.1   Definition of Terms and Scope

138.   The Education 2030 Construct Preliminary List defines attitudes as 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour' (Eagly & Chaigen, 1993, p.1). Further, it suggests that attitudes can be formed and changed and are generally considered much less enduring and stable than other personality attributes such as traits or temperament (Schwartz & Bohner, 2001). Attitudes are considered separate from and more malleable than personality tendencies and values. The Construct Preliminary List for Education 2030 includes the following list as attitudes: Intellectual curiosity, motivation, self-direction, locus of control, self-efficacy, and self-esteem. Intellectual curiosity is a tendency that begins in infancy and persists over the lifecourse, and it involves both a cognitive as well as an emotional reaction to stimuli (Peterson and Seligman, 2004), and thus does not meet the above definition above of an attitude. It is addressed in the section of this paper on social and emotional skills under engagement. Internal locus of control is included under the value of responsibility below. The rest of the constructs in the preliminary list are considered and addressed in the literature on social and emotional skills, and thus are addressed in that section of the paper. Instead, this section on attitudes will consider **growth mindset, adaptability, gratitude, and life satisfaction** as attitudes that are key to flourishing in the year 2030.

139.   Knowledge, skills, and attitudes, or KSA's are often considered the essential components of educational programs, and are based upon Bloom's taxonomy that includes cognitive (knowledge), psychomotor (skills) and affective (attitudes) learning (Bloom, 1956). Recent work in education and youth development programs has suggested that the order of how these are implemented is key. If youth first develop a positive attitude toward learning, and they value of what is being taught, and then develop the skills needed to be successful at learning something, they are much more likely to learn and understand the knowledge that is being imparted. Thus Making Cents International, through their work with youth in international programs, recently suggested reversing the letters from KSA to ASK, to represent the process that they found effective of first developing attitudes that are condusive for learning, developing skills that enable learning, and then, finally, acquiring and integrating knowledge (Proctor, 2016).   Key attitudes that promote skill development and learning include **growth mindset, adaptability, gratitude, and life satisfaction.**

Growth Mindset

140.   Growth mindset is the belief that one's abilities can grow with effort. Students with a growth mindset see effort as necessary for success, embrace challenges, learn from criticism, and persist in the face of setbacks (Dweck, 2006). Educational interventions that target open mindset can affect students'

experience and achievement in school, improving academic outcomes such as grades and test scores months and years later (Dweck et al, 2011). Simply changing someone from a fixed mindset (belief that intelligence is a fixed trait) to a growth mindset can foster student's desire to take on challenging tasks, effort put forth, and eventually improve educational outcomes (Dweck, 2006). Because of its importance, open mindset is one of the key constructs measured in the CORE districts of California, along with academic achievement. In the challenging educational and work environment of the 21st century, an open mindset will be an asset for youth as they learn and develop skills and knowledge necessary to succeed. It is related to social and emotional constructs such as engagement and self-motivation, and persistence, but it is clearly a belief that is supportive of development of a skill, rather than a social or emotional skill itself.

Adaptability

141.   Adaptability is being receptive to change, flexibility, as well as a capacity to tolerate ambiguity. It is an attitude in that it is a positive psychological response that is formulated based upon a stimuli (change) as opposed to a negative response, such as rigidity. It is related to the Big Five personality factor of Openness to Experience (OECD, 2015—OLIS framework). Flexibility was among a small set of approaches to learning identified for "advancing quality learning in vibrant societies" in recognition of changing world economy and the need for education systems to respond (Winthrop and McGivney, 2016). Even within existing businesses and organizations, rapid changes to industries, such as the automation of many tasks, are requiring the retooling of employees, with some workers already often going through several different re-trainings and adjustments to their skill sets in order to remain employable during their careers.

142.   In a review across the fields of workforce readiness, higher education, and youth development, the ability to adapt to different situations received research support in the fields of workforce readiness and healthy youth development more generally (Lippman et al., 2008). Furthermore, adaptability was among the top 10 constructs related to successful entrepreneurship in a systematic review of the literature (Lippman et al., 2015).   As the workplace becomes more entrepreneurial, (and it is expected to continue to do so), it will be imperative for young people to have an attitude of adaptability in order to be successful. More broadly, the Defining and Selecting Competencies project of the OECD identified dealing with ambiguity and uncertainty as opposed to focusing on closed solutions to problems as a key competency for a successful life given the rapid changing world (Haste, 2001). Furthermore, tolerance of ambiguity is recognized by the Council of Europe as a Key Competence required for citizens to participate effectively in a culture of democracy, and therefore it is important for civic engagement (Council of Europe, 2016).

Gratitude

143.   Developing an "attitude of gratitude" is popular in character education, for example, the Gifts of Character in Schools project, a character education project deriving "virtues" from a review of all the worlds traditions and cultures (Popov, 2000). Gratitude encompasses an appreciation of the good things or experiences one has received in ones' life through (a) recognition of positive things or experiences one has received, b) the experience of an emotion of thankfulness, and c) the consistent expression of thanks across situations and over time (Lippman et al, 2014b). It is linked with the emotions of joy and of life satisfaction and disposition of goodwill toward others. In that sense, the experience of gratitude is a motivator for prosocial and moral behaviour, and is protective against destructive interpersonal behaviours, and thus it functions to support reciprocity and positive civic behaviour in society (McCullough et al, 2001).

144.   Gratitude among individuals has been linked to higher levels of academic achievement, life satisfaction, social integration, prosocial behaviour and flow, as well as lower levels of depression and envy (Froh et al. 2010, 2011). Students with higher levels of gratitude among a U.S. national sample of 12-17 year olds were significantly more likely to have higher grades and less fighting, smoking and symptoms of depression after controls in multivariate analyses (Lippman et al, 2014b). Young adults who participated in a daily gratitude journal exercise had higher levels of alertness, attentiveness, determination, enthusiasm, and energy and were more likely to have helped someone else with a problem (Emmons and McCullough, 2003). In regard to physical health, gratitude and appreciation can positively affect cardiovascular and immune functioning, and produce entrainment across autonomic measures such as heart rate variability and respiration rate (McCraty et al, 1995).

Life Satisfaction

145.   Life satisfaction is an assessment of the extent to which one is happy with one's life and that one's life is on the right track (Keyes, 2006). It is a cognitive evaluation of life in its entirety, and is more stable than emotions or mood. It can sometimes be conceptualized as a mutlifacted construct, with subdomains such as satisfaction with school, family, or friends (Huebner et al., 2005), however, that overlaps with concepts such as school engagement and bonding or connectedess, which are more contextually specific and multifaceted, involving perception, emotional, and behvioral components (Fredericks et al., 2005, McNeely, 2005), and thus, are discussed in the section of this paper on social and emotional skills under engagement.

146.   Self-reported life satisfaction is a key indicator of positive well-being related to psychological and emotional health and is protective against adverse events. In a review of positive indicators of adolescent development, life satisfaction emerged with strong empirical evidence of a relationship to six different outcome areas, including promotion of academic achievement, overall well-being, and positive relationships; and a preventive relationship to substance abuse, delinquency, violence/externalizing behaviour, and depression/internalizing behaviour (Lippman et al., 2014a). Specifically, life satisfaction is related to higher levels of self-esteem and an internal sense of perceived control, and lower levels of internalizing and externalizing behaviours, depression, anxiety, sense of inadequacy, and sensation seeking in adolescence (Huebner et al., 2000; Suldo and Huebner, 2004; Casas et al., 2007). Higher levels of life satisfaction in a U.S. national sample of 12-17 year olds are related to less fighting, smoking, and depression, and to higher grades in multivariate analyses (Lippman et al, 2014b).

147.   Life satisfaction is the cognitive component of subjective well-being, which is researched extensively as an outcome in the The Children's Worlds international survey. Among 12 year olds, relationships and activities with families and peers, as well as neighbourhood safety, were related to their subjective well-being (Lee and Yoo, 2015). The OECD report, *Skills for Social Progress,* finds that social emotional skills are related to subjective well-being across countries and age groups (OECD, 2015).

148. *Outcomes Related to Attitudes Based Upon Above Cited Research*

 Education: Growth mindset, adaptability, gratitude, and life satisfaction have been found to improve academic outcomes including achievement, test scores and grades.

Workforce: Adaptability is particularly valued in the workforce, and it is expected that growth mindset will be increasingly important as workers will have to develop skills and knowledge themselves to compete in a complex economy. The benefits that accrue to those with an attitude of gratitude, such as higher levels of energy, alertness, attentiveness, determination, and enthusiasm will confer an advantage to workers in 2030.

Successful Life, Well-being, and Citizenship: Adaptability is linked to general positive youth development and a successful life and citizenship. Gratitude is predictive of life satisfaction, social integration, and prosocial behaviour, and less risk behaviours and physical health.   Life satisfaction is linked to psychological and emotional health, subjective well-being, and prevention of risk behaviours.

3.2   Values

3.2.1   Definition of Terms and Scope

148.   PIACC adopts the definition of personal values as "core conceptions of the desirable within every individual and society"(Rokeach, 1979).   A similar definition is, "conceptions of the desirable that influence the way people select action and evaluate events" (Schwartz and Bilsky, 1987, p. 550). Values are enduring, often culturally defined beliefs about what is good or bad, and what is important in life. Values develop through a process of exploration and experimentation, through which young people make sense of their experiences and refine what they believe (Nagoaka et al., 2015).   Values determine broad preferences about appropriate courses of action or desirable outcomes.

149.   Due to their all-encompassing nature, values influence the formation of more specific beliefs, attitudes, and opinions and as such have a persistent influence on behaviour. The values included in the Education 2030 Preliminary List are: **Trust, self-control, tradition, rule following/Traditionalism, integrity/honesty, grit, achievement, stimulation, power, security, conformity, benevolence, universalism, hedonism**.   Self-control is a social and emotional skill that is addressed in that section of this paper; Grit is a combination of perseverance and goal orientation, both of which again are social and emotional skills, therefore they are discussed in that section.

150.   The other values listed on the Education 2030 Preliminary list of constructs are drawn from a PIACC document citing Schwartz et al.'s Universal Values which are said to be found across all cultures (Schwartz et al., 2006) They include: tradition, achievement, stimulation, power, security, conformity, benevolence, universalism, and hedonism. This is one of several existing systems that identify values, and while some of these values do appear relevant for young people to acquire in order to flourish in school, work, and life in 2030, they are primarily descriptors of universal values that all societies share. The values from this list that do have relevance for young people include **achievement, benevolence, and universalism**. Achievement however, is so central to schooling as an outcome of learning and is assessed regularly, so it will not be addressed here as a value. Benevolence and universalism are important concepts that may be better labeled for students and teachers so that they can be understood as active values for individuals to adopt, rather than passive descriptors of values of societies.   So this section will propose a set of personal, interpersonal, societal, and transcendent values that will promote flourishing at each of those levels in the year 2030.   Personal values include **responsibility, integrity/ethics, purpose;** interpersonal values related to the term, "benevolence" in Schwartz's scheme include **altruism, and generosity**; societal values related to Schwartz's Universalism, include **justice, prosocial values, and environmental stewardship;** and transcendent values include **hope, and relationship to existence/identity.**

Personal Values

<u>Responsibility</u>

151.   A consensus definition of responsibility emerging across fields of education, psychology, economics, and employers has two components 1) an understanding and acceptance of one's role and reliably accomplishing tasks associated with this role (the ability to "take responsibility") and 2) the belief that personal choices and actions can influence the events in life and lead to positive outcomes (Lippman et al, 2015).   Having such an internal locus of control is a key component of taking responsibility; otherwise attribution for what has or will be experienced will rest outside the self; and a sense of responsibility, agency and self-efficacy may not develop optimally. The OECD OLIS framework defines responsibility as a social and emotional skill under the category of task performance: "time management, punctuality, and honoring commitments are critical to reliability and consistency, and engender trustworthiness (Is reliable,

can always be counted on). " (OECD, 2015, p.7). These skills are also called professionalism, diligence, trustworthiness, or dependability elsewhere, (see reviews in Lippman et al, 2015; 2014) and they speak to how responsibility manifests in the performance of tasks in the workplace.

152.   Indeed, in a systematic review of the literature, responsibility emerged as key to workforce success outcomes, including employment, performance on the job, wages, and entrepreneurial success, enjoying rigorous empirical literature as well as endorsement by several high level international consensus projects (Lippman et al, 2015). However, it is suggested here that responsibility is much broader than a workplace skill; it fits the definition of a value in that it is conceptualized as culturally desirable and organizes behaviour and perceptions of self and others, and it affects all aspects of life. On a personal level, being responsible means being accountable and keeping agreements, as well as accepting credit or acknowledging mistakes, as appropriate, as noted by a character education project that derived its "virtues" from a review of all world traditions and cultures (Popov, 1997). Strong evidence of responsibility's influence on other life outcomes comes from a systematic review of the empirical literature demonstrating that responsibility prevents violent behaviour and promotes positive reproductive health outcomes, for example (Gates et al., 2016).

Integrity/Ethics

153.   A consensus definition of Integrity/ethics emerging across fields of education, psychology, economics, and employers is abiding by ethical standards and socially accepted norms of privacy, honesty and respect and keeping to one's principles even when it is difficult to do so (Lippman et al., 2014b). Integrity/ethics is positively correlated with self-esteem and life satisfaction, as well as broad measures of psychological well-being, including positive mood, openness to experience, empathy, self-actualization, and conscientiousness (Deci and Ryan, 2000; Huebner et al., 1999), and self-concordance, which address the aspect of keeping to ones' principles, predicts greater investment of effort, and goal attainment (Sheldon and Elliot, 1999). In multivariate analyses, integrity/ethics predict higher grades, and less fighting, smoking and depression among 12-17 year olds (Lippman et al, 2014b). It ranked high among constructs emerging from a systematic review of the empirical literature in fostering the workforce outcomes of employment, performance, income and entrepreneurial success, and also in promoting sexual and reproductive health and preventing violence among youth (Lippman et al., 2015; Gates et al., 2016). Having integrity generates other's sense of one's trustworthiness and reliability, and thus affects one's ability to have positive relationships with others (see section on social and emotional skills).

Purpose

154.   A consensus definition of purpose is having a sense of directedness that stimulates one's goals, manages one's behaviours, and provides one a sense of meaning. Purpose is a broad and sustained intention to accomplish something one finds meaningful to the self, and, often, of consequence to the world.   Purpose is related to the metacognitive and social emotional constructs of self-awareness and positive identity, however it extends beyond them in that it is a consistent intention over time and organizes goals and behaviours. Purpose is related to the construct of "mattering"; that is, when youth are given meaningful roles in their communities in order to promote youth engagement (Eccles & Gootman, 2002).

155.   A sense of purpose drives life goals and daily decisions by guiding the use of finite attention and energy (Damon, 2008; Damon et al., 2003; Lippman et al., 2014b; McKnight and Kashdan, 2009). A multivariate analyses of youth ages 12-17 self-reports of purpose and outcomes found that a sense of purpose was significantly related to higher grades, less fighting, smoking and depression (Lippman et al., 2014b). These is strong research support indicating a relationship between purpose and well -being in adults (Damon, 2008). Youth who have meaningful roles in organizations and in their community had

fewer behavioral problems, higher skill levels, and were more likely to become engaged in the development of their community (Pittman et al., 2003). An important difference is that purpose is driven by the youth, not by community organizations. It will be critical for youth to develop a strong sense of purpose in order to contribute to the world meaningfully and with full engagement in the year 2030. Along with the social and emotional skills of agency, self-efficacy, and self-confidence, they can be successful in deploying themselves according to their self-defined purpose for the benefit of all.

Interpersonal Values

Benevolence

156.   Schwartz (2012) defines **benevolence** as having the goal of preserving and enhancing the welfare of those with whom one is in frequent personal contact (the 'in-group'). He suggests that the most critical contacts are relations within the family and other primary groups. Benevolence values express voluntary concern for others' welfare, such as forgiveness, true friendship, and mature love. A network of closely linked terms indicates this value of an orientation of the self toward others, including altruism, generosity, kindness, nurturance, care, compassion (Peterson and Seligman, 2004). There is some overlap here with social and emotional skills under the grouping of "engagement " used in that section in this paper, as well as under the category of "collaboration" the OECD framework for the longitudinal survey of social and emotional skills in cities (OECD, 2015). There, collaboration includes constructs related to tending and befriending others, such as compassion, respect, and relationship harmony. One can make a distinction between benevolence as an overarching value that an individual develops that then proactively drives positive interactions, while these specific social skills are the skills that are used in those interactions.

Altruism

157.   It is a specific example of benevolence that the world of 2030 would benefit from. It can be defined as showing unselfish concern for the welfare of others in one's thoughts and actions. It involves prioritizing the well-being of others, without concern for the self, and without the expectation of recognition (Lippman et al. 2014b; Peterson and Seligman, 2004). In a U.S. national sample of youth ages 12-17, altruism was related in multivariate analyses to lower levels of depression (Lippman et al., 2014b). It has been linked to qualities such as empathy, sensitivity, and nurturance, as well as specific caring actions in adults (Peterson and Seligman, 2004), and it is also related to **generosity**, which is driven by altruism and benevolence, including the voluntary giving of time, attention, and/material goods without conditions.

Societal Values

158.   **Universalism** as defined by Schwartz (2012) is the understanding, appreciation, tolerance, and protection for the welfare of all people and for nature. Universalism combines two subtypes of concern— for the welfare of those in the larger society and the world and for nature. An understanding, appreciation, and tolerance of **human dignity and diversity** underlies this value of universalism. Being able to work in hetergenous groups requires this understanding, appreciation, and tolerance. This was identified as one of the top overaching competencies for a successful life and well-functioning society in the Defining and Selecting Compentencies project of the OECD (Rychen and Salganik, 2003). This cross-cultural competency has both been found in reviews to be related to college readiness, and healthy youth development more generally, but the evidence is especially strong in the area of workforce readiness (Lippman et al., 2008). In a systematic review of the literature on workforce success, cultural sensitivity appeared in many international studies as being related to workforce success, including aspects of cultural awareness and expression; cultural literacy; understanding the role of culture more generally and its effects on language, behaviour and thoughts; understanding one's own cultural heritage; awareness and respect for

diversity; and global thinking. This value is thus closely linked to having knowledge of other cultures, as well as one's own. Getting along with and respecting people from diverse backgrounds, is also considered in a consensus definition from the literature as one component of social skills. As such, it was found in the review to be skill with the strongest evidence that it related to four specific outcomes related to workforce success (Lippman et al, 2015). This skill set is discussed in detail in the section of this paper on social and emotional skills.

159.   Related values under universalism include justice, prosocial values, and environmental stewardship.

Justice

160.   A sense of **justice** is fairness to all, the belief that all people should be treated as equal individuals, and should be not be judged based upon their gender, age, race, religion, nationality, sexual orientation, disability status, or any other characteristic. This requires valuing **human dignity and diversity**, which is discussed above under universalism. A sense of justice is one component of the development of moral judgement, and Kohlberg identified six stages of the development of justice reasoning based upon universal ethical principles of justice that are related to cognitive development, personality, values, and behavioral outcomes (Peterson and Seligman, 2004). Five domains of healthy psychological development are related to the development of justice moral reasoning, including moral identity formation, perspective-taking, self-reflection, self-esteem based upon self-perceived moral behavior, and relational problem solving. Thus, metacognitive, cognitive and social and emotional skills are enhanced through the development of justice moral reasoning. Lower stage justice reasoning is related to higher levels of delinquency, cheating and academic dishonesty, risky sexual behavior, substance abuse, and aggression, and other antisocial behaviors. Higher stage justice reasoning is related to cooperation, leadership, professional performance, altruism, civic disobedience and other prosocial behaviors (Peterson and Seligman, 2004).

Prosocial values

161.   **Prosocial values** and reasoning dispose youth to help others and contribute to the community, as well as to have the intention of doing so in the future (Scales and Benson, 2005).   The connection to cognition, knowledge and attitudes is strong with this construct. Prosocial values have been shown to promote social contribution, life satisfaction, academic achievement and school bonding, positive relationships with peers and adults, and to be protective against substance abuse, delinquency, violence/aggression, and depression among youth (Lippman et al., 2014a). Volunteerism, is a prosocial behavior, and it has many positive correlates, including psychological and physical health, civic engagement, skill development, positive identity, school belonging and engagement, valuing diversity, leadership, coping and overcoming adversity. Volunteerism also prevents risk behaviors such as substance abuse, violence, and risky sex (Peterson and Seligman, 2004; Scales and Benson, 2005).

Environmental stewardship

162.   **Environmental stewardship** is an organizing value that generates care for and improvement of the earth's environment by being informed (thus requiring relevant knowledge about environmental science), assuming or recognizing personal responsibility (another value above), and environmental action (behavior). In a national sample of youth ages 12-17, environmental stewardship was significantly related to higher grades and less smoking (Lippman et al., 2015). This value will be critical for all youth to take on in the coming years to ensure survival of life on earth, and evidence on its relationship to other outcomes will build as more research studies include measures of it.

Transcendent Values

Hope

163.	**Hope** is defined as a general and broad trust that the future will turn out well, both for one's own life and generally (Lippman et al, 2014b). Hope allows youth to transcend their current circumstances by envisioning a brighter future. It is a critical value that generates positive behaviors and outcomes, particularly for those youth who are critically ill, disconnected or excluded from society, living in poverty or conflict zones, or suffering in any other way. It has both cognitive and emotional aspects, though the emotional aspect is stronger, and is related to social and emotional and cognitive skills that are more limited in scope and pertain to specific circumstances, such as goal orientation, future orientation and optimism (Peterson and Seligman, 2004)). Articles rigorously assessing hope demonstrate a relationship with a number of positive outcomes, including avoidance of substance abuse, lower levels of depression, positive youth development as defined by the five C's: competence, confidence, connection, character, and caring) and social contribution (leadership, service, and helping) (Caldwell et al., 2006; Carvajal et al. 1998; Schmid et al. 2011). In a national sample of 12-17 year olds, hope was significantly related to higher grades, and less fighting, smoking, and depression in multivariate analyses (Lippman et al., 2014b).

Relationship to Existence/Identity

164.	Establishing a relationship to existence, through beliefs, values, and experiences of the transcendent, organizes meaning and directs relationships and behaviors (Peterson and Seligman, 2004). Developmental science recognizes that developing a relationship to existence and a sense of the transcendent is an important part of identity development in adolescence (Roehlekepartain, et al., 2006). Developing a relationship to existence may involve seeking or experiencing awareness or awakening to a universal unity; being or becoming aware of the sacredness of one's self, others, and the universe (which may be understood as included the Divine); and cultivating identity, relationships, meaning, and purpose that flow from this awareness (Benson et al., 2012; Lippman et al., 2014b). It is differentiated from organized religion in that the searching and the experiences of a connection to something beyond daily life occurs through private contemplation, learning, activities, and spiritual support (Hodge et al., 2001). Increasing proportions of youth identify as "spiritual but not religious" (Fuller, 2001; Lippman and Keith, 2005). A relationship to existence is experienced with great diversity, and commonly includes, but is not limited to the following: 1) transcendent awareness (connection to a unity of life that transcends the self, which can include experiences of awe, nature, and an awareness of a life force that connects all life), 2) awareness of an inner source of one's being, or soul; and/or 3) awareness of a Creator or Divinity, or ancestors or angels.

165.	Cultivating a positive relationship to existence is protective against drug use (Hodge et al., 2001) and smoking, and is related in multivariate analyses to higher grades (Lippman et al., 2014b). A longitudinal study of spirituality and religiosity among teenagers in the U.S. finds that those that had a devoted or regular practice or belief system were more likely to plan for the future, think about the meaning of life, make moral decisions, have positive relationships with parents and other adults, volunteer to help others, give generously, and accept leadership roles. They were less likely to smoke, drink alcohol, cut class, get low grades or get suspended or expelled from school, participate in risky sex, experience depression, dishonesty, or feel misunderstood, discouraged, or lonely (Smith and Denton, 2005). A growth in spirituality among young people may be related to trends towards deinstitutionalization, individualization, and globalization, (Marler et al., 2002), and these trends are likely to continue until 2030.

Outcomes Related to Values Based Upon Above-Cited Research

Education: Responsibility is a key component of educational behaviours, such as attending class and completing work on time, that are most predictive of academic success. Integrity/ethics has been found to predict higher grades. Purpose is also related to educational engagement, goal orientation, and higher grades. Universalism, especially cross-cultural competence, is related to college readiness. Metacognitive and cognitive skills are enhanced through justice moral reasoning. Prosocial values promote academic achievement and school bonding and engagement. Environmental stewardship and hope are both related to higher grades. A positive relationship to existence is related to higher grades and fewer suspensions or expulsions from school.

Workforce: Responsibility is one of the top ten "soft skills" found to predict workforce success and Integrity/Ethics also ranked high among qualities that are predictive of workforce success in a systematic review of the literature. The cross-cultural competency aspect of universalism is particularly important to workforce success. Purpose promotes higher skill levels among youth. Higher stage justice reasoning is related to cooperation, leadership, and professional performance. Prosocial values, hope, and a positive relationship to existence promotes leadership, planning and decision-making in young people's careers.

Successful Life, Well-being, and Citizenship: Responsibility affects relationships and all aspects of life, and has been found in a systematic review to rank among the top skills that prevent violent behavior and promote positive sexual and reproductive health outcomes. Integrity/ethics is related to positive self-esteem, life satisfaction, and psychological well-being, and prevents risk behaviours, including violence, and promotes positive sexual and reproductive health outcomes. A sense of purpose prevents risk behaviours and promotes meaningful community service and well-being among youth and adults. Altruism is related to lower levels of depression among youth and caring actions and generosity among adults. Cross-cultural competency is related to healthy youth development and is one of the top competencies necessary for a successful life and well-functioning society. Higher stage justice reasoning is related to altruism and prosocial behaviours. Prosocial values are protective against risk behaviours and promote positive behaviours including social contribution, and psychological and physical health. Environmental stewardship prevents certain risk behaviours and is a form of civic engagement. Hope generates positive outcomes including psychological and emotional health, positive youth development, and social contribution, as well as lower levels of risk behaviours. A positive relationship to existence is protective against risk behaviours and is promotive of planning, moral decision-making, positive relationships, and volunteering, among other aspects of a successful life and citizenship.

3.3   Malleability

166.   Open mindset has proven to be malleable based upon educational interventions (Dweck, 2006; 2011). Adaptability appears in many workforce studies and is a focus of workforce training programs, indicating malleability (Lippman et al, 2015). Gratitude is a subject of psychological, school-based, religious, and physical based (such as heart math) interventions and is malleable (Peterson and Seligman, 2004). Life satisfaction among youth can be improved by an engagement, activities, and by improving relationships with significant others, as well as through higher levels of social and emotional skills (Lee and Yoo, 2015). All of the values discussed above have evidence of malleability to various degrees in the psychological literature (Peterson and Seligman, 2004). In general, the attitudes and values that are more trait like are less likely to be malleable within a short period of time during interventions in school or afterschool programs. For example, adaptability (related to the Big 5 Personality Factor of Openness to Experience) may take longer to improve than growth mindset, for which there is evidence that it can be improved during school-based interventions. However, research demonstrates that even trait-like attitudes and values do change over the life course (Roberts et al., 2006).

3.4   Measurability

167.   All of the constructs proposed in this section are already measured in the studies cited above and listed in the references, so they are all, in fact, measureable. Numerous compendia of measures exist from which to draw for additional measures, both for use in schools, youth development and workforce development programs, as well as in research studies. (For examples, see the International Personality Item Pool (http://ipip.ori.org/) Lippman et al., 2014b; Moore and Lippman, 2005; the Search Institute's Developmental Assets, under positive values http://www.search-institute.org/content/40-developmental-assets-adolescents-ages-12-18 and the 4-H Study of Positive Youth Development https://cyfar.org/positive-youth-development-student-questionnaire for starters. The majority of measures above are self-report, although there are also reports by "others" such as teachers and parent reports, as well as observational measures. In the psychological literature cited, there are clinical interviews or written group administered and objectively scored assessments (Peterson and Seligman, 2004). Self-reports are commonly used because they are easy to administer and analyse, inexpensive, and potentially reliable (Duckworth and Yeager, 2015). Self -report comes with two kinds of biases, however. Reference bias occurs since frames of reference differ by respondents according to their social group norms, and social desirability bias or "faking", occurs when individuals provide answers that they perceive to be "desirable". It is known that there is a tendency in most cultures to rate oneself at the high end of a scale on a socially desirable quality, as well as to rate oneself in reference to one's own group. These tendencies not only bias results for individuals, but obstruct accurate comparisons across participants in a program, or across programs and cultures, and across time. Using reports by others along with self-reports, and focusing items on actual observable behaviours as well as actual performance or direct assessment rather than endorsements of statements, can produce more objective results (Blades et al., 2012; Center for the Economics of Human Development, 2015; Duckworth and Yeager, 2015).   In addition, anchoring vignettes and situational judgment tests have been successful in reducing these biases and increasing validity and reliability across cultures, but require a more sophisticated and costly administration and analysis process, and a higher level of literacy of respondents than simple self-report items.

Section IV: Preliminary construct analysis focusing on malleability

168.   What knowledge, skills, attitudes, and values will our young people need in order to meet new challenges and achieve success in life and in work in the 21st century? What competencies are needed to ensure that children and youth will thrive and flourish in their roles as the citizens of tomorrow? In the face of current societal, economic, environmental, and social challenges, including increasing economic interdependence, extensive intercultural contact, and the rise in knowledge-based societies, identifying the cognitive and social and emotional skills and competencies that children and young people need for the future is critical now more than ever before in history (Schonert-Reichl and Weissberg, 2014).

169.   What has emerged in recent years is a growing consensus among educators, researchers, policy makers, and the public-at-large that what is needed is a more comprehensive vision of education —one that not only includes an explicit focus on promoting students' content areas in subjects such as reading, writing, numeracy, science, and social studies, but one that includes a focus on educating "the whole child" to fosters a wide range of cognitive and social and emotional competencies (Association for Supervision and Career Development, 2007; Bushaw and Lopez, 2013; Greenberg et al., 2003; Miyamoto, Huerta and Kubacka, 2015; OECD, 2015).

170.   Indeed, for today's children and youth to achieve success in school and in work and to become happy, productive, and healthy citizens in a global economy, it is vital that we identify the cognitive and social and emotional skills that are needed to insure our young people are fully prepared for their adult roles as citizens, employees, parents, and volunteers (Heckman, 2007; National Research Council, 2012; Partnership for 21st Century Skills, 2011). Moreover, recent evidence in education shows that the

development of a variety of social-emotional skills, attitudes and behaviours may be essential to long-term cost savings by promoting positive labour market outcomes in adulthood (Jones et al., 2015; Heckman & Kautz, 2012).

171.   Yet, in order to achieve this goal, it is necessary to first determine the degree to which the competencies needed for success in the 21st century are "malleable" – that is, the extent to which they can be promoted and cultivated in response to educational interventions.

172.   This paper reviews recent evidence from multiple disciplines including education and psychology on the "malleability" of several salient dimensions of skills, attitudes, and values that forecast young people's positive development and success in school and work. We focus primarily on development of selected cognitive and social and emotional constructs with adolescence as the target age group. We begin this paper by defining the concept of malleability and summarize some of the recent research from the fields of education, psychology, social neuroscience, and epigenetics that informs our current understanding of the concept of malleability with regard to child and adolescent development. In the next section, in order to provide a context in which to better understand the ways in which competencies unfold across development, we discuss different theoretical views on children and adolescents' cognitive and social-emotional development that have outlined the mechanisms and processes by which development occurs, highlighting the various issues of which one needs to be cognizant when understanding adolescent development. Following, we identify and describe a corpus of competencies that have been identified as critical in predicting future development and which have also been identified as being promoted through educational interventions and life experiences. For each construct, we first begin with a definition, and then where applicable describe how children develop the construct from childhood to adolescence, emphasizing the importance of the construct in the context of adolescence. Next, we describe related constructs within or across the domain/sub-domain in the learning process. Following, we delineate research evidence supporting the constructs' "malleability" by primarily drawing from intervention research findings and identify the learning processes utilized to promote the construct. The paper ends with some conclusions on how an understanding of malleability has implications for the future of education and some future directions for work in this area.

173.   It is beyond the purview of this paper to discuss in detail the malleability of the full range of cognitive and social and emotional competencies that children and young people need. Instead, what we have done is to identify a corpus of those competencies for which there is some recent scientific evidence of their malleability via intervention research demonstrating that the construct can be promoted.

4.1   *Malleability, Neuroplasticity, and Recent Scientific Evidence*

Malleability

174.   To be **"malleable"** is to be "a. capable of being altered or controlled by outside forces or influences, and b. having a capacity for adaptive change "(http://www.merriam-webster.com/dictionary/malleable). In relation to educational and psychological contexts, malleability refers to the notion that a construct can change in response to educational interventions and life experiences (National Research Council, 2012).

175.   Children and youth in today's world will be able to meet future challenges if they are provided with the conditions and experiences that enable them to develop the knowledge, skills, attitudes, and values that will allow them to achieve their full potential for the world of tomorrow (National Science Foundation, 2014). Understanding those factors that they need to be on a path to becoming happy, healthy, productive, and caring adults has long been an important objective for educators, parents, policymakers, and societal agencies interested in the promotion of competence, well-being, and success in school and career, and in

the prevention of unfavourable outcomes, such as school dropout, mental illness, and criminality. Indeed, such knowledge assists individuals who influence children's development to promote those competencies that forecast future success, and ideally to prevent detrimental outcomes.

176.   This interest in discerning how educational and other experiences in childhood and adolescence pave the road for successful adult adjustment is spurred, in part, by recent ground-breaking research that that has identified a corpus of attitudes, values, and skills that provide a foundation for positive health practices, engaged citizenship, and school and career success (Greenberg et al., 2003; Weissberg et al., 2015), and serve as protective factors that mitigate problems and risks (e.g., Luthar, 2006; Schonert-Reichl and LeRose, 2008; Masten & Cicchetti, 2016).

177.   One approach to promoting the well-being and success of our young people and to insure that they grow into productive adults is to identify the cognitive and social emotional skills that are considered to be "malleable" – that is, changed and promoted through education and other experiences. Although the previous terminology in psychology referred to many of these constructs as "traits," hence conveying a sense of immutability or permanence, current descriptions identify these constructs as "skills" because they can be shaped and changed over the life cycle. In the words of Kautz et al. (2014: 10), "The distinction between skills and traits is not just a matter of semantics. It suggests new and productive avenues for public policy."

178.   Nonetheless, although an emerging body of research has documented that many cognitive and social-emotional skills, attitudes, and values are malleable across development and can be promoted via experiences and improvements in learning environments (Almlund et al., 2011), a popular view often held by laypersons is that many cognitive, and social and emotional competencies and skills are fixed and difficult to improve, particularly through formal schooling (Miyamoto, Huerta and Kubacka, 2015). This gap between what is known in science versus in the public represents a challenge to address as we move forward in the field.

179.   The degree to which constructs are malleable can vary across child and adolescent development. Indeed, it is important to be cognizant of the notion that interventions designed to improve skills may be more or less effective at different developmental stages and vary in the degree to which different skills are malleable. As posited by Kautz et al. (2014: 7), "During the early years, both cognitive and non-cognitive skills are highly malleable. During the adolescent years, non-cognitive skills are more malleable than cognitive skills. The differential plasticity of different skills by age has important implications for the design of effective policies."

Neuroplasticity

180.   Neuroplasticity (also described as "brain plasticity") refers to the way in which the circuitry of the brain changes across the entire life span of development. For many decades, there was a consensus among scientists that the brain develops during a sensitive period in early childhood, then remains relatively unchangeable (or "static") afterward.

181.   Ground-breaking new research that has emerged during the last half of the 20th century challenges these pre-existing beliefs about the brain's malleability by demonstrating that the brain is changeable (or "plastic") to experience across childhood and adolescence, and even into adulthood (Baltes, Reuter-Lorenz, and Rösler, 2006; OECD, 2007; Pascual-Leone, Amedi, Fregni and Merabet, 2005).

182.   However, much of the research conducted on neuroplasticity has been designed to elucidate the neural changes induced by the training of motor and cognitive abilities through interventions (Karni et al.,

1995; Olesen et al., 2004), while a relative paucity of research has focused on the study of neuroplasticity in relation to neural changes in the social and emotional competencies (Klimecki et al., 2012).

183.   Informed, in part, from recent innovations in the area of developmental neuroscience and the concept of "neuroplasticity," the past decade in particular has seen the emergence of research documenting the critical role that a wide corpus of cognitive and social and emotional skills, such as self-regulation, emotions, empathy, and social and emotional understanding can be promoted through experiences and education (e.g., Diamond et al., 2007; Diamond and Lee, 2011; Durlak et al., 2011). As such, it is increasingly clear that in order to understand the best way to promote a range of important cognitive and social and emotional skills and competencies that forecast adult outcomes, it is necessary to understand that the brain as a system that is malleable and open to the effects of experience over time.

184.   One of the most important scientific discoveries from developmental neuroscience in the past decade is the identification of early childhood and adolescence as critical periods for brain development (Eccles and Roeser, 2009; Giedd, 2008; Oberle, Schonert-Reichl and Thomson, 2010). Although it is important to note that there is extant research providing evidence of neuroplasticity throughout the entire lifespan (Hübener and Bonhoeffer, 2014 for a review), even showing that these critical windows are not definite, and that there is a potential for these windows to be reopened by some external influences (Spolidoro et al., 2011; Vetencourt et al., 2008).

Malleability in the Context of Adolescent Development

185.   Adolescence is characterized as transitional time in the life cycle; a time that provides a unique opportunity in which to study human development due to quantity, nature, and speed in which changes that occur. Indeed, there are relatively few developmental periods in which so many changes occur in a relatively short time-span – physical changes, biological changes in relation to brain development and puberty, cognitive and emotional changes, and changes in social relationships, including an increasing focus on the peer group and changes in the nature of parent-child and adult-child relationships (Eccles et al., 1993). It is also during these years when adolescents become less egocentric and are able to consider the feelings and perspectives of others – they develop a sense of right and wrong and have the capacity to act in accordance with their higher levels of social understanding (Schonert-Reichl, 2011).

186.   It is particularly important to note that in adolescence the biological systems underlying body and brain development and the psychological systems related to social and emotional skills are highly malleable – that is changeable in response to experiences and education (Blakemore, 2008, 2012; Ernst, Pine and Hardin, 2006; Zelazo and Carlson, 2012).

187.   Transitional periods such as adolescence have been defined as phases in the life span in which developmental challenges and demands are intensified, and can be considered phases as heightened "vulnerability and risk." Transitional periods have also been characterized as "transition-linked turning points" in development; events that have the potential to alter behaviour, affect, cognition, or context and can result in lifelong changes (Graber and Brooks-Gunn, 1998).

188.   Nonetheless, transition periods should not only be thought as "risk promoting" or "vulnerability inducing" times in child development – transitions may also be thought as "windows of opportunity" – times in the life cycle in which positive development can be cultivated and fostered through opportunities provided to the individual in his/her environment that "promote" success, and serve as "protective" factors that move the individual on a path to becoming a happy, healthy, and productive adult.

189.   Characterizing adolescence as a time of opportunity or risk is dependent on how well families, schools and communities respond to, and governments and societies address and invest in, the unique

developmental needs of adolescents (e.g., Eccles and Roeser, 2010). Through identifying the nature and scope of the social environments that are most salient in reducing risks and promoting positive development, adolescents' full potential can be cultivated and nurtured in order to face the challenges and opportunities in the world in the 21st century (Greenberg et al., 2003; MLERN, 2012).

190.   Research on brain development during middle childhood and adolescence is still in a nascent stage, but we do know more today about the young person's brain than ever before (Blakemore and Mills, 2014; Casey et al., 2008; Siegel, 2013; Steinberg, 2007). One of the recent discoveries in neuroscience has been that the brain is always developing and some areas appear to develop more rapidly during adolescence in contrast to later developmental periods (Paus, 2005). Rapid changes that occur during adolescence are seen predominantly in the *prefrontal cortex* - the area of the brain responsible for reasoning, planning and decision-making, the regulation of emotions and abstract and hypothetical thought. Recent research has also shown that development is occurring even in other areas of the brain, and that these different areas become more interconnected with maturation (Blakemore, 2012; Luna and Sweeny, 2001). This development occurs through processes of "pruning," or the deterioration of nerve connections, and "myelination," which strengthens them. The growth or deterioration of these pathways is determined by whether these connections are being used.

191.   Research has also documented risk taking occurs more frequently greater during adolescence in contrast to childhood and adulthood, and is associated with subcortical systems known to be involved in evaluation of incentives and affective information (Casey et al., 2008).

IQ versus Social and Emotional Skills: What Does the Research Say?

192.   An emerging body of empirical research has demonstrated that a range of cognitive and social and emotional skills compete with IQ in predicting socially valued outcomes, such as educational attainment, employment, health, and criminality (Kautz et al., 2014). Recent longitudinal research by Heckman and Kautz (2012), for example, revealed a weak association between achievement and future life outcomes. Similarly, Castex and Dechter (2014) found that cognitive ability has actually declined as a determinant of wages over the last two decades.

193.   Research indicates that emotions and relationships affect how and what is learned (Hymel, Schonert-Reichl and Miller, 2006; Izard, 2002; Spinrad and Eisenberg, 2009).

194.   Moreover, a growing body of research demonstrates the inextricable link between emotions and learning. As Immordino-Yang and Damasio (2007) assert, "The aspects of cognition that are recruited most heavily in education, including learning, attention, memory, decision making, motivation, and social functioning, are both profoundly affected by emotion and in fact subsumed within the processes of emotion" (p. 7). In short, how individuals feel affects how and what they learn, hence underlining the importance of focusing on understanding the ways to attend to the social and emotional dimensions of teaching and learning.

195.   Nonetheless, what remains clear from the extant research is that social and emotional competencies and skills are intertwined with human development and learning across the life span. For example, social and emotional skills support learning of academic content (National Research Council, 1999) with recent evidence indicating that learning is enhanced when an individual is able to reflect on his or her learning and adjust learning strategies according via the utilization of interpersonal skills by intrapersonal skills, such as self-awareness and metacognition (Hoyle and Davisson, 2011; National Research Council, 2001).

4.2   Skills, Attitudes, and Values that Forecast Young People's Academic and Life Success

196.   Emerging research points to the salience of social and emotional skills in predicting life outcomes. Indeed, while empirical evidence indicates that both IQ and social and emotional skills predict scores on achievement tests (Kautz et al., 2014), recent evidence indicates social and emotional skills predict outcomes above and beyond their effects in predicting scores on achievement tests (Jones et al., 2015; Moffitt et al., 2011).

Relations of Social and Emotional Skills to Academic Success

197.   Recognizing the interrelationships between social-emotional competence and academic success, researchers have argued that fostering positive social and emotional development may be key to enhancing academic growth (see Greenberg et al., 2003; Zins et al., 2004).

198.   In a study of 423 sixth and seventh graders, Wentzel (1993) found that students' prosocial classroom behaviours, such as helping, sharing, and cooperating, were better predictors of academic achievement than were their standardized test scores, even after taking into account academic behaviour, teachers' preferences for students, IQ, family structure, sex, ethnicity, and days absent from school. Similarly, in a longitudinal study of 294 Italian children, Caprara, Barbaranelli, Pastorelli, Bandura, and Zimbardo (2000) found that prosocial behaviour in third grade (average age 8.5 years), as rated by self, peers, and teachers, significantly predicted both academic achievement (explaining 35 percent of the variance) and social preference (explaining 37 percent of the variance) five years later, when children were in eighth grade. Most interestingly, this "prosociality" score, which included cooperating, helping, sharing, and consoling behaviours, significantly predicted academic achievement five years later, even after controlling for third-grade academic achievement. In contrast, early academic achievement did not contribute significantly to later achievement after controlling for effects of early prosociality.

199.   In a more recent short-term, longitudinal study of 441 sixth-grade Canadian students, Oberle et al. (2014) examined the association between social and emotional competence and academic achievement in early adolescents. Social-emotional competence in grade six, operationalized in terms of both self-reports of social responsibility goals and teacher assessments of frustration tolerance, assertive social skills, task orientation, and peer interaction, were evaluated as predictors of student academic achievement test scores in math and reading in grade seven. As hypothesized, teachers' reports of students' social-emotional competence significantly predicted higher scores in math and reading in seventh grade. Self-reported social-emotional competence in grade six was a significant predictor of grade seven reading scores for boys but not girls. Although more research is needed regarding the link between SEL and academic achievement, there is a confluence of empirical evidence suggesting that, if students' success in school is desired, efforts should be made to intentionally and explicitly teach social and emotional skills.

Relations of Social and Emotional Skills to Adult Success

200.   A growing body of literature supports the premise that children's social and emotional competence not only predicts success in school (for example, see Oberle, Schonert-Reichl, Hertzman and Zumbo, 2014; Wentzel, 1993), but also predicts a range of important outcomes in late adolescence and adulthood, including physical health, substance dependence, and overall well-being (Moffitt et al., 2011).

201.   In addition to playing a crucial role in predicting academic success, recent longitudinal research also documents links between children's social and emotional skills and later success in adulthood. Jones, Greenberg, and Crowley (2015) examined the degree to which late adolescent and early adult outcomes were predicted by teacher ratings of children's social competence measured many years earlier, when children were in kindergarten, following 753 kindergarten children longitudinally 13 to 19 years later.

Kindergarten teacher ratings of children's prosocial skills (getting along with others, sharing, cooperating) were found to be significant predictors of whether participants graduated from high school on time, completed a college degree, obtained stable employment in adulthood, and were employed full time. Moreover, kindergarten children who were rated by their teachers as high in prosocial skills in kindergarten were less likely as adults to receive public assistance, live in or seek public housing, be involved with police, be placed in a juvenile detention facility, or be arrested. Early social competence inversely predicted days of binge drinking in the last month and number of years on medication for emotional or behavioural problems during high school. Given these findings, the authors emphasized the importance of assessing young children's social and emotional competence early on. They contended that these "softer" skills can be more malleable than IQ or other cognitive measures and, hence, important contenders for intervention.

202.   In another recent and notable longitudinal study, Moffitt et al. (2011) followed a cohort of 1,000 children from birth to age 32 in New Zealand, assessing children's self-control across the ages of 3, 5, 7, 9, and 11 years via reports from researcher-observers, teachers, parents, and the children themselves. Self-control in childhood was found to predict physical health, substance dependence, personal finances, and criminal offending in adulthood, even after taking into account intelligence, social class, and problems the children had in adolescence (for example, smoking, school dropout, unplanned pregnancy). The authors concluded that focusing on the promotion of children's self-control "might reduce a panoply of societal costs, save taxpayers money, and promote prosperity" (p. 2693). Thus, results from several recent longitudinal studies examining the association between early SEL skills and later adult adjustment suggest that, in the long run, higher levels of social and emotional competence can increase the likelihood of high school graduation, financial success, mental and physical health, and reduced criminal behaviour.

Malleability of Cognitive and Social Emotional Skills, Values, and Attitudes

203.   As noted earlier, research from the field of developmental cognitive neuroscience (Diamond, 2012), indicates that social and emotional skills can be taught across the life span and are viewed as more malleable than IQ.

204.   Perhaps some of the most compelling evidence for the malleability of social and emotional skills comes from a recent meta-analysis conducted by Durlak et al. (2011). However, prior to describing this research, we would like to begin by first providing an extant definition of social and emotional learning (SEL).

205.   Historically, SEL has been characterized in a variety of ways, often being used as an organizing framework for an array of promotion and prevention efforts in education and developmental science, including conflict resolution, cooperative learning, bullying prevention, and positive youth development (Devaney, O'Brien, Resnik, Keister and Weissberg, 2006; Elias et al., 1997). SEL builds from work in child development, classroom management, prevention, and emerging knowledge about the role of the brain in self-awareness, empathy, social-cognitive growth (e.g., Gallese and Goldman, 1998; 2006; Greenberg, 2006), and focuses on the skills that allow children to calm themselves when angry, make friends, resolve conflicts respectfully, and make ethical and safe choices.

206.   Since 1994, the Collaborative for Academic, Social, and Emotional Learning (CASEL) (www.casel.org), a non-profit organization in Chicago, IL, has been at the forefront in North American and international efforts to promote SEL. Since its inception, CASEL has defined SEL more specifically and has served as a guide to school-based SEL programming (CASEL, 2003). Based on extensive research, CASEL (2013) has identified five interrelated sets of cognitive, affective, and behavioural competencies that are central to SEL.

- **Self-Awareness:** The ability to accurately recognize one's feelings and thoughts and their influence on behaviours. This includes accurately assessing one's strengths and limitations, and possessing a well-grounded sense of confidence and optimism.

- **Self-Management:** The ability to regulate one's emotions, thoughts and behaviours in different situations. This includes delaying gratification, managing stress, controlling impulses, motivating oneself, and setting and working towards achieving personal and academic goals.

- **Social Awareness:** The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behaviour, and to recognize family, school, and community resources and supports.

- **Relationship Skills:** The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking help when needed.

- **Responsible Decision Making:** The ability to make constructive choices about personal behaviour, social interactions and school and life expectations based on consideration of ethical standards, safety concerns, social norms, realistic evaluation of consequences of various actions, and the well-being of self and others.

207.   The meta-analysis conducted by Durlak et al. (2011) examining the effectiveness of SEL programs included 213 school-based, universal SEL programs involving 270,034 students from kindergarten through high school examining findings of effectiveness in terms of six outcomes:

- Social and emotional skills;

- Attitudes toward self and others;

- Positive social behaviours;

- Conduct problems;

- Emotional distress; and

- Academic performance

208.   Their findings revealed that students in SEL programs, relative to students who did not receive an SEL program, were found to demonstrate significantly improved social-emotional competence, attitudes, and behavioural adjustment (increased prosocial behaviour and decreased conduct problems and internalized problems). SEL students also outperformed non-SEL students on indices of academic achievement by 11 percentile points. Durlak et al. (2011) found that classroom teachers and other school personnel effectively implemented SEL programs. Thus, SEL programs can be easily incorporated into routine school practices and do not require staff from outside the school for successful delivery.

209.   To provide the "practical value" for academic achievement gains for students in the SEL intervention group versus students in the control group, Durlak et al. (2011) next calculated Cohen's U_3 "improvement" index to translate the mean effect size on measures of achievement to a score that reflects the average percentile rank for the average student of the intervention compared to the average student in the control group (who, by definition, would be at the 50th percentile; Institute of Education Sciences,

2008). Their analysis revealed that an effect size of 0.27 translated into an 11% percentile difference. Put another way, the average student in the control group would demonstrate an 11 percentile increase in academic achievement if he/she had received an SEL program. Taken together, these results provide strong empirical evidence for the "value-added" of SEL programs in fostering students' social and emotional skills, attitudes, and behaviours, and also counter the claim that taking time to promote students' SEL would be detrimental to academic achievement.

210. Do students maintain their SEL competencies after the SEL program has ended? Findings from Durlak et al.'s (2011) meta-analysis provide additional support for the durability of effects of SEL programming on students' social and emotional competencies. Among the smaller group of 33 interventions that included follow-up data (with an average follow-up period of 92 weeks), the positive effects at the time of follow up remained statistically significant, although the effect sizes were smaller. Thus, Durlak and his colleagues (2011) provide some empirical evidence about the sturdiness of the effects of SEL interventions longitudinally.

211. Research by Hawkins et al. (2008) exemplify the potential long-term positive effects of multi-year SEL programming on student outcomes. Specifically, Hawkins et al. found significantly reduced diagnosable mental health disorders (e.g., major depression, generalized anxiety disorder) at age 24 and age 27, 12 and 15 years after their SEL intervention had ended. Their results also showed intervention effects indicating better educational and economic achievement among those individuals who received the SEL intervention in contrast to those who did not. Although more research is clearly needed, Hawkins et al.'s research provides important evidence about the potential long-term benefits of SEL interventions.

212. Sklad and colleagues (2012) also conducted a meta-analysis of 75 recently published studies of SEL programs and found results that mirror those of Durlak et al. (2011). Similar results were obtained in a more recently conducted meta-analysis by Sklad et al. (2012) of 75 recently published studies of SEL programs. Sklad et al. found that universal, school-based SEL programs had significant positive effects on seven outcomes: social-emotional skills, prosocial behaviour, positive self-image, academic achievement, antisocial behaviour, mental health problems, and substance abuse. Not surprisingly, the most positive effects were found for social-emotional skills, with an effect size of .70. In other words, students participating in SEL programs had social-emotional skills 7 standard deviations higher than comparison students, indicating that the average SEL program student had better social-emotional skills than 76 percent of non-SEL students. Moderate effect sizes (program effects of nearly a half of a standard deviation) emerged for four of the outcomes: academic achievement, positive self-image, prosocial behaviour, and antisocial behaviour. As for follow-up effects, the largest effects were found for academic achievement, followed by substance abuse.

4.3 *The Role of Environment in Promoting Knowledge, Skills, Values, and Attitudes in Adolescence*

213. The nature-nurture controversy asks the question, "Is human development predetermined at birth, by genes, or do experience and other environmental factors influence one another?" Although for many decades there was a belief that heredity was destiny, today developmental psychologists and those from related disciplines, such as education, neuroscience, and the like readily acknowledge the role of a variable combination of both inborn factors and social experiences when explaining children's behaviour and subsequent outcomes. Indeed, some of the most ground-breaking research that has emerged in the field of child development in the past decade is increased understanding of the effect of environments on children's short- and long-term health and well-being (Biglan, Flay, Embry and Sandler, 2012). Indeed, new research has now elucidated the ways in which children's early and later environments impact a variety of biological systems, including immune systems, cardiovascular health, endocrine regulation, and brain

malleability (Blair et al., 2011; Hertzman and Boyce, 2010; Shonkoff, 2012; Shonkoff, Boyce and McEwen, 2009).

Gene-Environment Interactions and Development

214.   Some of the most pioneering research that has come to light with respect to the critical role of environment in influencing children's short and long-term health and well-being originates from the emerging field of epigenetics. Most notably is the research that demonstrates that exposure to certain environmental contexts can change whether and how genes are expressed (Meaney et al., 1996). For example, environments that are characterized as being chronically stressful lead to physiological changes that place children at risk for long-term health and mental health consequences. Moreover, early childhood experiences such as trauma, abuse, and neglect are associated with a range of detrimental outcomes in adulthood, including chronic cardiovascular disease, alcoholism, decreased immune function, and mental health problems (Gunnar and Fisher, 2006; Shonkoff et al., 2009). Hence, these early experiences get "under the skin" and become built into the body effecting not only learning, but also a host of health outcomes (Shonkoff, 2016).

215.   Advances in the field of social epigenetics has revealed the importance of gene-environment interactions and suggest that there are striking individual differences in neurobiological sensitivities to contexts (Boyce, 2015). Similarly, recent research has underlined the particularly during the brain makes modifications and the environment matters.

216.   Jack Shonkoff (2016), in a recent article delineating the ways in which to mobilize advances in science to reduce the detrimental consequences of early childhood experiences, posits, "This growing knowledge base suggests 4 shifts in thinking about policy and practice: (1) early experiences affect lifelong health, not just learning; (2) healthy brain development requires protection from toxic stress, not just enrichment; (3) achieving breakthrough outcomes for young children facing adversity requires supporting the adults who care for them to transform their own lives; and (4) more effective interventions are needed in the prenatal period and first 3 years after birth for the most disadvantaged children and families" (p. 1003).

An Ecological/Contextual Perspective on Development and Malleability

217.   When considering the ways in which to promote and cultivate students' knowledge, skills, values, and attitudes it is important to take a developmental systems perspective that "recognizes that human development is a bidirectional, individual ↔ context relational process" in which "there are multiple levels of organization within the individual (e.g., genes, motivation, and cognitive abilities) that influence one's development course," and "different levels of organization within the social ecology (e.g., families, schools, and neighbourhoods) that contribute to development" (Theokas and Lerner, 2006: p. 61).

218.   Following Urie Brofenbrenner's contextual perspective (1979), we believe that the topic of malleability and development cannot be fully addressed without seeing the child and adolescent in his or her broader social and cultural context. This approach stems from a developmental perspective that presupposes that a network of influences supports the lives of children and that the developing child is significantly influenced by his or her environmental context.

219.   Bronfenbrenner's model of the nature and levels of context has catalysed the field of child development (Bronfenbrenner, 1979; Bronfenbrenner, 1995) because it provides a framework that takes into account the layers of influences on development. His ecological model posits four levels for classifying context beginning with those ecologies in which the child directly interacts and proceeding to increasingly distant levels of the social world that affect a child's development.

220.   Following is a delineation of these various systems in Bronfenbrenner's model. These are illustrated in Figure 1.

- Microsystem – everyday environment (examples: family, friends, school, neighbourhoods)

- Mesosystem – connections between aspects of the microsystem (examples: child to parent, parent to school, child to school)

- Exosystem – encompasses social institutions (examples: government, community, schools)

- Macrosystem – larger cultural influences (examples: society in general, religious systems, political thought, beliefs about child development)

- Chronosystem – underlies all other systems (examples: historical events and changes)

221.   The first level, the *microsystem*, is composed of ecologies with which the child directly interacts such as the family, school, peer group, and neighbourhood. The *mesosystem* encompasses the relations between the various microsystems (e.g., the family-school connection or between the parents and the child's peer group and peers' families). The absence of mesosystem links may also be an important risk factor in development, such as when the neighbourhood does not have institutions that provide support for the child and/or his or her family. Both the microsystem and mesosystem are often affected by circumstances that do not directly involve the child. For example, children may be significantly affected by changes in family circumstances such as parental divorce, parental social support, changes in the legal system (e.g., changing definitions of neglect or abuse), the social welfare system (e.g., welfare reforms, boundary changes for categorical services), the mass media (e.g., controls on children's exposure to television violence, the availability of troubling media via the internet), or other social structures that set policies and practices that alter microsystem and mesosystem interactions. The *exosystem* is those contexts and actions that indirectly impact the child's development. Such as societies' beliefs about how children develop and the supports needed to lead children along a path to positive development. Different societal policies and practices reflect different expectations for children and beliefs about how child can achieve the factors valued. Many preventive interventions may be viewed as changes at the exosystem level that alter interactions among lower system levels. Finally, the *macrosystem* represents the widest level of systems influence, consisting of the broad ideological and institutional patterns and events that define a culture or subculture.

222.   With respect to the exosystem level, societies' beliefs about children and child development shape childrearing practices and reflect the particular achievements valued in a society. According to Newman, Bidjerano, Ozdogru, Kao, and Ozkose-Biyik (2005: 3)," Child rearing practices, including the structure of children's after-school activities in a particular society, are indicative of how that society projects itself into the future." This is important to keep in mind when considering the community and societal supports in place to foster children's development during the out of school hours.
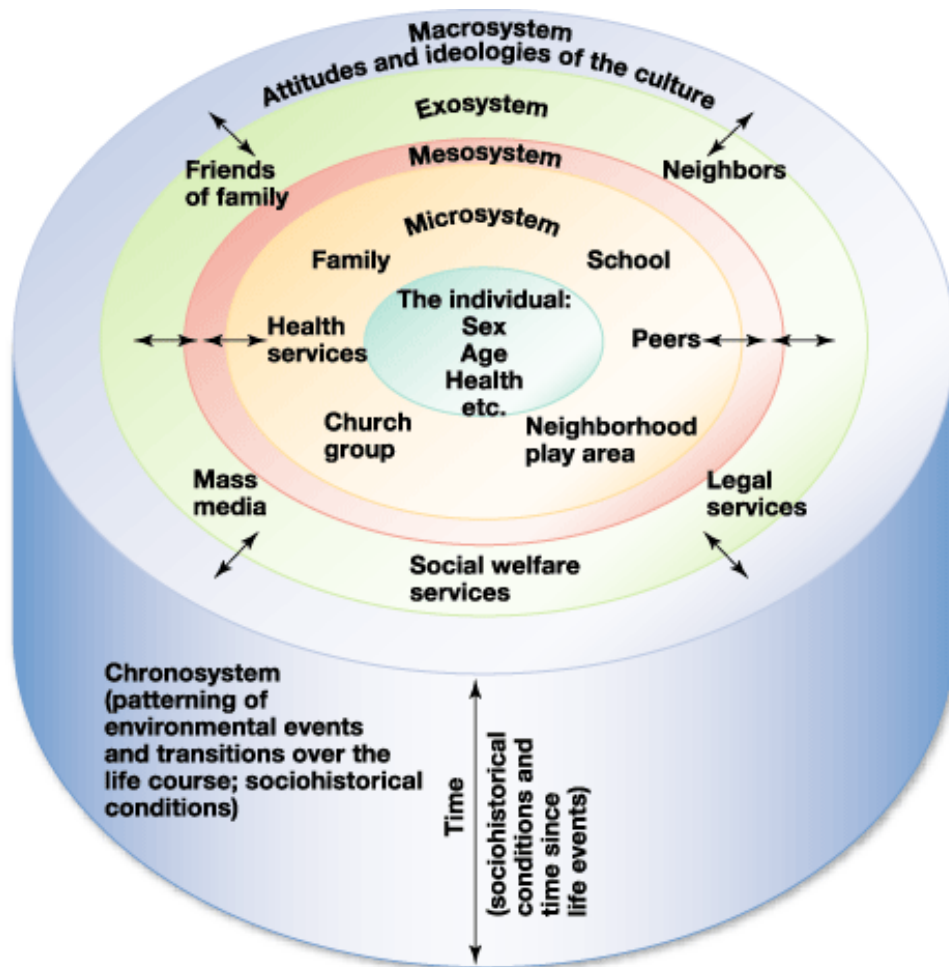
Education Contexts that Promote Students' Cognitive and Social and Emotional Knowledge, Values, and Skills

223.   A necessary but not sufficient condition for the promotion of cognitive and social emotional skills, values, and attitudes is a safe, caring, participatory, and well-managed learning environment. Recent research points to the importance of classroom environments (Milkie and Warner, 2011) and positive teacher-student relationships in promoting students' positive academic, and social and emotional competence (Birch and Ladd, 1998; Brackett, Reyes, Rivers, Elbertson and Salovey, 2011; Gest, Welsh and Domitrovich, 2005; Hamre and Pianta, 2001, 2006; Hargreaves, 2000; Jerome, Hamre and Pianta, 2009). Hence, in addition to focusing on specific instruction in social and emotional skills, creating a school and classroom community that is caring, supportive, and responsive to students' needs is vital. Indeed, effective education and interventions that promote skill development should occur in an environment that is safe, caring, supportive, and well managed—an environment that supports a child's development and provides opportunities for practicing the skills. Issues including communication styles, high performance expectations, classroom structures and rules, school organizational climate, commitment to the academic success of all students, district policies, teacher social and emotional competence (Jennings and Greenberg, 2008), and openness to parental and community involvement are all important components of an SEL approach.

224.   With regard to SEL skill development, a person-centred focus indicates that social and emotional education involves *teaching* children and adolescents to be self-aware, socially aware, competent in self-

management and relationship skills, and able to make responsible decisions. SEL instruction is most effective when provided through multi-year, integrated programming and when it involves partnerships of schools, families, and communities. Moreover, effective SEL programs infuse SEL into the regular school curriculum. For instance, some programs encourage students to apply SEL skills more generally to such areas as goal setting to improve their study habits. Other SEL programs infuse the development of SEL skills with academic subject matter, such as providing a literature activity that requires using social awareness to understand a protagonist's perspective in a novel.

4.4 Skills, Values and Attitudes for Success in the 21st Century

Creativity

225. **Definition of *Creativity*:** Creativity has been defined in numerous ways, but generally there are two definitions of creativity. The first is derived from an individualist approach or creative cognition framework that studies one person who is engaged in creative thought or behaviour. In this context, creativity is defined as a novel combination of thoughts and concepts that is subsequently expressed in the world (Sawyer, 2012). Second, creativity can also adopt a sociocultural lens. This approach defines creativity as the production of a work that is judged as original and socially valuable in some way by a knowledgeable social group (Sawyer, 2012; Sternberg and Lubart, 1999). Being socially valuable means it is useful and/or appropriate, i.e., easy to display, disseminate or perform. The latter definition has been more widely adopted by creativity researchers. Recently, the additional element of "surprise" has been added to the existing criteria of novelty and utility to reflect the United States Patent Office's invention specifications for patent approval (Simonton, 2012). In terms of measurement, creativity generally has been measured by examining the following facets: 1) divergent thinking (e.g., the ability to produce multiple alternative solutions rather than just one correct solution); 2) problem solving (e.g., the ability to produce an original solution to new problems, or from available materials or information); 3) performance (e.g., generation of creative products); 4) attitudes and behaviour (e.g., responses to creativity, efforts leading to creative thought and performance) (Scott, Leritz and Mumford, 2004). These are the most widely used definitions, but there are many more, which have led to an equal number of instruments created to measure them (Treffinger et al., 2002), many of which do not correlate with one another (Baer, 2016).

226. **Constructs related to *Creativity*:** Interestingly, the constructs used to measure and define creativity are those that are related to creativity, such as divergent thinking. Divergent thinking, as conceptualized by Guilford and colleagues (Wilson et al., 1954) related components of intellectual ability to the construct of creativity; they include: 1) fluency of thought, 2) flexibility of thought, 3) originality, 4) sensitivity to problems, and 5) figural and semantic elaboration. This construct, however, has been found to be a necessary but insufficient attribute of creative performance, particularly in differentiating between individuals who exhibit everyday creativity from highly creative achievers (Batey and Furnham, 2006).

227. Another construct related to creativity is cognitive flexibility, which is one of the core executive functions, and is essential for creative thinking (Davidson et al., 2006; see section on executive functions; Diamond, 2013).

228. **Development of *Creativity* in the Life Cycle:** Understanding whether and how creativity develops depends largely upon how creativity is conceptualized and the instrument used to measure it. A few developmental studies of creativity have found that, overall, it holds steady or increases during the early elementary years, declines steadily during the late elementary, and then increases again in high school, an indication that creativity continues to develop during adolescence (Claxton, Pannells and Rhoads, 2005). In comparison to the period prior to the 1990s, creativity has declined most for children in kindergarten to third grade (Kim, 2011), which some have attributed to the rise in standardized testing

(Robinson and Aronica, 2009). Such correlations can be seen in cultures where high-stakes standardized testing is part of the cultural norm (Niu and Sternberg, 2003). The type of creativity exhibited also shifts developmentally from a fantasy-based one in childhood to one that requires reason and objectivity in adolescence (Vygotsky, 2004). Nonetheless, the continued development of and plasticity of mental processes underlying creative thought and activity suggests that creativity matures and develops with training, age, and lifetime experience (Klingberg, 2010; Stevenson et al., 2014). Social-cultural inquiries have found that adolescents engage in the creativity process in at least one of four ways: adapting an existing idea to one's own, transferring ideas from one domain to another, synthesizing or combining two different ideas, and generating new ideas or work as an expression of individuality not based on existing work (Lassig, 2013).

229. The period of adolescence may be critical for increasing creative capacities, as it has been found to be related to improved academic achievement (Freund and Holling, 2008). Other studies suggest creative environments may lead to improved academic achievement, increased engagement, creativity thinking, and social-emotional development (Davies et al., 2013).

230. **Evidence of Malleability of *Creativity*:** The extant literature indicates creativity is malleable to some degree. Among the intervention studies that have been conducted, far more have been with children, with greater effectiveness found for programs targeting children under 14 years old as compared to adolescents (Scott, Leritz and Mumford, 2004). Those below age 14 demonstrated stronger effects in the area of performance (.56 vs. .18) while older populations were found to have stronger effects in the areas related to attitude and behaviour (0.31 vs. -0.09). Among the few studies conducted with adolescents, one study found that creativity training led to increased originality and uniqueness as compared to adults (Stevenson et al., 2014).

231. Investigations in the area of creativity are still emerging in the research literature, and the challenge among stakeholders who aim to cultivate creativity among adolescents stems from the multitude of definitions and measures available for creativity (Treffinger et al., 2002). The type of intervention or program one will employ depends largely on the type of creativity one intends to promote, and vice versa. For instance, if an intervention encourages starting with existing material and adapting it, then that will be the process the students use when engaging in creativity (Lassig, 2013). Some research has examined the potential processes by which creativity could be enhanced, such as paying attention to the physical environment (e.g., displaying works in progress), classroom environment (e.g., providing equal amounts of structure and freedom for assignments), and engaging the community (e.g., working collaboratively or with visiting artists) (Davies et al., 2013). Nonetheless, stakeholders should take note that researchers suggest the need for creativity to be cultivated in the context of specific domains or tasks, rather than generally (Baer, 2016), as there is evidence that training in one context doesn't carry over to other contexts (Baer, 1996; Burgess and Addison, 2007).

Empathy

232. **Definition of *Empathy*:** In his book "Theory of Moral Sentiments" written over two centuries ago, Adam Smith (1790) described empathy as ''the ability to understand another's perspective and to have a visceral or emotional reaction'' (as cited by Hastings, Zahn-Waxler and McShane, 2006). Contemporary definitions of empathy hold the essence of Smith's definition, as illustrated by the following descriptions of empathy from some of the preeminent researchers and theorists in the field of empathy:

- One particular set of congruent vicarious emotions, those that are more other focused than self-focused, including feelings of sympathy, compassion, tenderness, and the like...empathy is distinct from feelings of personal distress (Batson, 1991: 86).

- An affective response that stems from the apprehension or comprehension of another's emotional state or condition, and that is similar to what the other person is feeling or would be expected to feel (Eisenberg, Fabes and Spinrad, 2006: 647).

- An affective response more appropriate to another's situation than one's own (Hoffman, 2000: 4).

233.   Common to all of these definitions is the notion that empathy includes 1) an affective response ("feeling with another"), and 2) a distinction between self and other.

234.   Feshbach (1979) has put forth a three-component model in which empathy is conceptualized as comprising both cognitive and affective components: (a) The ability to discriminate and label affective states in others; (b) the ability to assume the perspective and role of another person; (c) emotional responsiveness, that is, the affective ability to experience emotions. According to Feshbach, comprehension of another person's affect – that is, cognitive performance - is an indispensable prerequisite for feeling with another.

235.   **Constructs related to *Empathy*:** Perspective-taking, sympathy, compassion, personal distress, altruism, social responsibility, prosocial behaviours.

236.   Many researchers have spent considerable time trying to distinguish empathy from other related constructs, including sympathy, compassion, and personal distress (Batson, Fultz and Schoenrade, 1987; Eisenberg, 1986; Feshbach, 1975; Hoffman, 2000; Wispé, 1986). Eisenberg, Spinrad, and Sadovsky (2006), for instance, have posited a clear distinction between empathy and sympathy. In their view, *empathy* is considered a mirroring or vicarious experience of another's emotions whereas *sympathy* "is an affective response that frequently stems from empathy, but can derive directly from perspective taking or other cognitive processing, including retrieval of information from memory. It consists of feeling sorrow or concern for the distressed or needy other (rather than feeling the same emotion as the other person is experiencing or is expected to experience)" (p. 647). In other words, empathy reflects *feeling as* the other feels whereas sympathy reflects *feeling for* the other. In contrast, *personal distress*, which also emerges from exposure to another person's distress, refers to a self-focused and aversive reaction (e.g., anxiety, discomfort) to the vicarious experiencing of another's emotion (Batson, 1991; Eisenberg, Shea, Carlo and Knight, 1991). Personal distress—an aversive, self-focused emotional reaction to the apprehension or comprehension of another's emotional state or condition—is believed to undermine other-oriented prosocial behaviour.

237.   Compassion, which is much like sympathy because it instigated from the suffering of another, is considered to be both a dimension of morality and an important aspect of both ethical behaviour and interpersonal responsibility (Knafo, Zahn-Waxler, Van Hulle, Robinson and Rhee, 2008). Compassion, however is distinguished from sympathy in that it moves beyond the sole focus on a *concern* for the well-being of someone in distress and includes a need or desire to *alleviate* that person's suffering (Eisenberg, 2002). Both empathy and prosociality are considered to be essential components of compassion.

238.   **Development of *Empathy* in the Life Cycle:** During the past few decades, the empathy construct has received considerable attention by psychologists and educators alike because of its association with positive behaviour and psychological adjustment. Indeed, empathy has been identified by some as one of the most essential of all personality traits because it motivates helping and other prosocial behaviours (e.g., sharing, cooperation, altruism) and inhibits aggressive behaviours (Batson, 1991; Hoffman, 2000; Eisenberg and Miller, 1987; Miller and Eisenberg, 1988). Empathy and its related characteristic also play a key role in social understanding (Schonert-Reichl, 1999; Schultz, Selman and LaRusso, 2003), and serves as the foundation for positive social relationships (Schonert-Reichl, 1993) and academic achievement (Caprara, Barbanelli, Pastorelli, Bandura and Zimbardo, 2000; Wentzel, 1993).

Although debates arise when trying to come to agreement regarding the primary function of empathy in both human and nonhuman species, recent theoretical, methodological, and empirical advances seem to point to the importance of empathy in helping individuals form and maintain lasting social bonds (Anderson and Keltner, 2002; deWaal, 2005). Thus, empathy is an aspect of human development that is critical for overall social functioning.

239.   For centuries, there has been a belief held by parents, educators, professionals, and others in the general public that children are inherently selfish and egocentric and characterized by a lack of caring for others' needs. Current research, however, has debunked this perspective and we know now that already at the age of 2, children show the cognitive capacity to interpret, the emotional capacity to affectively experience the state of others, and the behavioural repertoire to alleviate discomfort in others as illustrated by the recent work of Warneken and Tomasello (2006).

240.   Hoffman (1982, 2000) has been acknowledged as being one of the first in the field to propose a theoretical model that describes the development of empathic distress from infancy to childhood. In his four-level model, he delineates a developmental shift that occurs across childhood that moves from an egocentric self-concern in response to others' distress to empathic concern for others that results in prosocial behaviour that is other-oriented.

241.   In his first stage – "Global Empathy" – which occurs between the ages of 0 and 12 months, Hoffman (2000) posits that witnessing another person in distress may result in a global empathic distress response that is elicited from distress cues from a dimly perceived "other." At this stage, because infants can not yet distinguish themselves from the other, they may act as though what they witnessed happening to the other, happened to themselves. One example of this may be when a child, upon seeing another child fall and cry, responds by crying himself/herself and seeks comfort from his/her mother – behaviours that he/she does when hurt. At this stage, however, it is not clear whether the infant can distinguish who is in distress.

242.   Hoffman considers the reactive new-born cry to be a simple form, or precursor of global empathy. According to Hoffman (1982), even very young children are considered to have a biological preparedness to attend and respond to other people's emotions, a conclusion drawn by researchers from observations of the tendency in babies to start crying in response to hearing other crying babies (Hatfield, Cacioppo and Rapson 1993; Martin and Clark, 1982;). In fact, controlled experiments have shown that while infants tend to cry in response to hearing other babies cry, they do not cry in response to a similar, but computer simulated sound of equal loudness (Simner, 1971) and they cry less in response to the cry of a chimpanzee, or even when they hear the tape-recorded sound of their own cry (Martin and Clark, 1982). There thus seems to be something unique infants are reacting to when hearing the cry of another infant, causing a state of agitation and discomfort.

243.   It is during the second year of life in which true empathy likely emerges (Eisenberg, Spinrad and Sadovsky, 2006). It is at this time in which the child can fully distinguish himself/herself from others and can recognize when someone else is in distress. This stage in Hoffman's theory is identified as "Egocentric Empathy." Hoffman (1984) identifies the acquisition of "object permanence" at this stage in development as the mechanism responsible for leading children to have a sense of the other as a physical entity distinct from themselves. In other words, the child can now be aware that the other person, and not oneself, is in distress. Nonetheless, the internal states of others are unknown and the child still confuses others' inner states with his/her own. For example, upon hearing the cry of another, a toddler will provide help that he himself would find comforting, such as offering his own favourite toy or getting his/her own mother.

244.   Hoffman has described the child at the age of 1 to 2 years as experiencing "egocentric" empathy. Take, for example, his description of a child at this age:

245.   The child is fully aware of the self and other as distinct physical entities and thus [is] able for the first time to experience empathic distress while also being aware that another person, and not the self, is the victim. Children cannot fully distinguish between their own and other person's inner states, however, and are apt to confuse them with their own, as illustrated by their efforts to help others, which consist chiefly [in] giving the other person what they themselves find most comforting. Examples are a 13-month-old who responded with a distressed look to an adult who looked sad and then offered the adult his beloved doll; and another who ran to fetch his own mother to comfort a crying friend, even though the friend's mother was equally available (Hoffman, 1982, pp. 287-288).

246.   Hoffman's third stage of empathy – "Empathy for Another's Feeling" – begins to appear in the third year as the child begins to take the perspective of another and can offer help that the other might need. This stage, according to Hoffman, occurs between the ages of 3 and 8 years. The child is now increasingly aware of other people's feelings and that other people's perspectives may be different from his/her own perspective and hence, the child becomes more responsive to the cues about what the other is feeling. Increases in language skills also enable the child to derive meaning from symbolic cues of affect and he/she is not able to be able to empathize with a wide range of complex emotions, including disappointment and feelings of betrayal. At the latter part of this stage, the child obtains an ability to empathize with the complex emotions that may accompany a victim's distress, including the victim's *not* to be helped (Hoffman, 1984). Moreover, it is at this stage when a child can begin to exhibit the ability to experience empathic responses even when the distressed person in not physically present – as is the case when the child hears or reads about another person's distress.

247.   Finally, during late childhood and early adolescence, the fourth stage emerges – "Empathy for Another's Condition." It is during this fourth stage of development in which the child is now able to have feelings of empathic distress for an entire group or class of people (e.g., homeless, poor –or oppressed). Owing to increased cognitive maturity and sophistication in conceptions of self and other as continuous persons with separate identities and histories, the child realizes that she/he and others are independent persons whose emotions may be tied to not only the current situation but also to a unique history of past events and large life experience.

248.   Empirical data generally supports Hoffman's (2000) view that empathy shifts from a less mature and surface level understanding of another's distress to a more complex and sophisticated understanding of distress that in not transitory but chronic from the early years and into adolescence. This development shift in empathic understanding is partly due to increased competence in children's ability for detecting and understanding emotions in themselves and others (Eisenberg, Murphy and Shepard, 1997) and advances in perspective-taking (Selman, 1980). Hoffman (1982) proposed that improvement in young children's perspective taking is critical to children's abilities to differentiate between their own and others' distress and to accurately understand others' emotional reactions. These skills are believed to foster empathy and sympathy and, consequently, more and higher quality prosocial behaviour.

249.   During and after the transition to adolescence, research demonstrates that patterns of empathic responding remain stable (e.g., Davis and Franzoi, 1991). Additionally, the capacity to take others' perspectives and to empathize with individuals who are not present increases in adolescence (Eisenberg, Cumberland, Guthrie, Murphy and Shepard, 2005; Hoffman, 2000). Other research, most from longitudinal studies have suggested decreases in empathy in adolescence (e.g., Eisenberg and Miller, 1987; Helson, Jones and Kwan, 2002). Moreover, cohort studies examining empathy have noted a significant decline in empathy among college students from 1979 to 2008 (Konrath et al., 2011).

250.   **Evidence of Malleability of *Empathy*:** According to Hoffman (2000), empathy development can be nurtured and promoted through socialization experiences in which the adults in the child's environment practice and model inductive approaches to discipline – socialization practices in which the parent,

caregiver, or teacher highlight the other's perspectives, point out the other's distress, and make clear to the child that his/her actions caused it. This would include situations in which children are confronted with having to resolve conflicts in which their own interests are pitted against the needs of others. These discipline situations – in which children harm or about to harm others whose interests conflict with their own -- can occur at home, in child care settings, and in schools, and offer an opportune time for adults to intervene and guide children on a positive developmental path toward higher levels of empathy. Hoffman (2000) argues that: "Whether the harm done by the child is accidental or intentional and whether the victim is a parent or a peer, it is only in discipline encounters that parents are likely to make the connection, necessary for guilt and moral internalization between children's egoistic motives, their behaviour and their behaviour's harmful consequences for others -- and put pressures on children to control their behaviour out of consideration for others" (p. 142).

251.   Hoffman (1984) outlines five ways in which parents and/or caregivers can promote empathy in children and youth:

1. ***Permit children to experience a wide range of emotions.*** Because it is generally considered to be easier to empathize with someone's emotions when you have experienced that emotion yourself, children need to develop a wide repertoire of emotion experiences to make them more empathically responsive.

2. ***Direct children to the internal states of others.*** Empathy is typically considered to be an involuntary response if one actively witnesses a victim's – therefore, it is critical that parents and caregivers provide experiences in which a child has the opportunity to witness the other's emotional distress. Inductive discipline approaches discussed earlier in which the parent or caregivers calls attention to the pain or injury caused by the child's action or encourages the child to imagine how he/she would feel to be in the victim's place are examples of this approach.

3. ***Provide role-taking/perspective-taking opportunities across contexts.*** In order to hone children's competencies in "standing in the shoes of another," they need repeated opportunities to take the perspectives of others. These activities can be promoted through a variety of mediums, including books and television.

4. ***Give children lots of affection.*** Hoffman argues that providing children with affection will make them less absorbed in their own needs and more open to the needs of others.

5. ***Be a role model by behaving in a prosocial manner and verbalizing your empathic feelings.*** Children learn from what they observe, and they need to be in contexts in which adults are helpful and kind to one another and to the children with whom they interact. It is also critical that children are in contexts in which the discussion of empathy and empathic feelings is part of everyday conversations. This will result not only in children learning a large corpus of emotion words, but will also lead to higher levels of empathic responsiveness in children.

252.   Another researcher who has identified several ways in which to cultivate children's empathy and related behaviours is Staub (1988, 1991, 2005). He suggests that in order to foster caring and nonviolent behaviours in children, we have to cultivate in them a "prosocial value orientation." One of several characteristics of this prosocial value orientation is the tendency toward positive rather than negative evaluation of others. Other characteristics include concern for other people's welfare (i.e., empathy, sympathy) – and a feeling of personal responsibility for what happens to others. Staub (1988, 1991, 2003, 2005), like Hoffman (2000) contends that we must provide a context in schools and families in which children can development of skills for empathy and concern for others. He has outlined the ways in which parents and educators can contribute to the development of children's prosocial value orientation, which

include the following: 1). Positive discipline practices, 2) Democratic and autocratic modes of operation, 3) Guided participation in prosocial activities that benefit others, and d) Cooperative vs. competitive learning experiences.

253.   There exists empirical data of the malleability of empathy and related such constructs as prosocial behaviours (e.g., helpfulness, kindness, and cooperation). For example, evaluations of the "Roots of Empathy (ROE) Program" have shown that empathy can be promoted. ROE is a theoretically-derived, universal preventive intervention that facilitates the development of children's social-emotional understanding in an effort to reduce aggression and promote prosocial behaviour. The cornerstone of the program is monthly visits by an infant and his/her parent(s) that serves as a springboard for lessons on emotion knowledge, perspective-taking, and infant development. Facilitated by a trained ROE instructor, each visit of the baby and his/her parent follows a lesson plan with 9 different themes (Meeting the Baby, Crying, Caring and Planning for the Baby, Emotions, Sleep, Safety, Communication, Who am I?, Goodbye and Good Wishes), helping children to understand and reflect on their own and others' feelings. Over the course of the school year, children learn about the baby's growth and development via interactions and observations with the baby. Each month the ROE program instructor visits his/her participating classrooms three times, once for a pre-family visit, another time for the visit with the parent and infant, and finally, a post-family visit. The lessons for the visits from the instructor foster empathy, emotional understanding, and problem- solving skills through discussion and activities in which the parent-infant visit serves as a springboard for discussions about understanding feelings and infant development and effective parenting practices. Specifically, each lesson plan is designed to capitalize on shared observations from the family visit. Lesson plans and accompanying activities are scripted to match the age of the baby and are calibrated to the students' level of development. Each of the ROE lessons provides opportunities to discuss and learn about the different dimensions of empathy, namely emotion identification and explanation, perspective-taking, and emotional sensitivity. For example, across various lessons children are invited to identify the emotions of the baby and to provide explanations for those emotions. Following, children then become engaged in lessons either through stories, art activities, and general classroom discussion in which they reflect and discuss their own emotions and the emotions of others. For Theme 3 (Caring and Planning for the baby), for instance, in the pre-family visit, the instructor reads the book *Sasha and the Wriggly Tooth* 69 to the children. After the story, the instructor leads a discussion with the children about the mixed feelings that can ensue when one loses a tooth (e.g., "happy to be getting a visit by the tooth fairy," "embarrassed because you may look funny with a missing tooth"). In the subsequent parent and infant visit, children are provided opportunities to perspective take through asking questions of the parents about their feelings about their infant's teething experience (e.g., "how does it feel to see your baby in pain," "what do you do to help your baby feel better?"). Also included in the ROE program are lessons that engage children *collectively* in a series of activities that benefit the baby – those activities identified by Staub (1988) as ones in which a prosocial value orientation can be fostered. From singing a welcoming song to the baby upon his/her arrival to the classroom, to creating a book of nursery rhymes, in every lesson children are brought together to form a unified "we." The ROE curriculum is aligned with the *functionalist* approach to emotions (Campos, Mumme, Kermoian and Campos, 1994), wherein emotion understanding and expressivity are seen as playing central roles in the establishment and maintenance of children's interpersonal relationships (Mostow, Izard, Fine and Trentacosta, 2002; Saarni, 1999; Shipman, Zeman, Penza and Champion, 2000). As well, the ROE model's "roots" are founded on the belief that "emotions form the motivational bases for empathy and prosocial behaviour" (Izard et al., 2002: 761).

254.   To date, there have been several outcome studies examining the efficacy of ROE (see Schonert-Reichl and Scott, 2009 for a review). These include an examination of ROE's effectiveness with primary grade children, a multi-site evaluation (including children in Vancouver and Toronto), and two randomized controlled trials (RCT). Research on the effectiveness of ROE has yielded consistent and highly promising findings regarding the impact of the program across age and sex (Schonert-Reichl, 2005; Schonert-Reichl, Smith and Zaidman-Zait, forthcoming; Schonert-Reichl, Smith and Hertzman, 2007). Children who have

participated in ROE, compared to those who have not, demonstrate advanced emotional and social understanding, as well as reduced aggressive behaviour (specifically proactive aggression) and increased prosocial behaviour.

255.   Consistent findings emerged across our research studies evaluating the effectiveness of ROE. Specifically, results revealed that children who had experienced the ROE program, compared to children who had not, were more advanced in their emotional and social understanding on almost all dimensions assessed. Developmental changes in children's social and emotional knowledge were associated with concomitant reductions in aggressive behaviours and increases in pro-social behaviours (helping, sharing, cooperating). Most notably, while ROE program children significantly decreased in aggression across the school year, comparison children demonstrated significant increases aggression. Subsequent studies evaluating changes in experiences within the classroom found a significant increase in children's assessments of classroom supportiveness and their sense of belonging in the classroom.

256.   The *Facing History and Ourselves* program (https://www.facinghistory.org) is another program that has demonstrated that constructs relevant to empathy, such as civic efficacy and tolerance for others with different views, can be promoted during adolescence. The program integrates the study of history, literature, and human behaviour with ethical decision-making and aims to promote students' historical understanding, critical thinking, and social-emotional development. Students in the program engage in reflecting on history, make connections to current events, and discuss the choices they confront and how they can make a difference in the world. The program is available for grades 6 through 12, and can be embedded within the social studies, humanities, and language arts curriculum. The program can be implemented classroom- or school-wide, and includes activities to involve the family and community in activities (e.g., community members come into the classroom to share their experiences). There is no set number of lessons outlined in the program. The recommended amount of training for the program is two to five days. Implementation support is available for teachers. In a large randomized control trial, Facing History and Ourselves has been found effective in enhancing students' social-emotional skills and attitudes and in enhancing teachers' teaching practices (Barr et al., 2015).

257.   In a recent review of empathy interventions for children and adolescents, Malti et al. (2016) identified and assessed the 19 school-based interventions targeting empathy-related responding across childhood and adolescence to determine the extent to which the programs aligned with developmental theory and research. Criteria utilized to select the prevention and interventions programs included; (a) the effectiveness of the program was demonstrated via rigorous experimental or quasi-experimental designs, (b) the curriculum utilized in each program targeted the promotion of empathy and/or dimensions related to empathy (perspective-taking, emotion understanding, and prosocial behaviour), (c) the program was either a universal or targeted program and was school based (classroom or afterschool), and (d) the target grade for the program was between prekindergarten and Grade 8. Malti et al. (2016) noted that because there was a general dearth of empathy programs for adolescence, interventions designed to promote empathy beyond Grade 8 were excluded.

258.   To select the programs for their review, the authors drew from two sources that had conducted rigorous reviews of social and emotional learning (SEL) programs: The 2013 CASEL Guide and the Life course Interventions to Nurture Kids Successfully (LINKS) database. In 2013 CASEL reviewed more than 200 SEL preschool and elementary school programs and identified 23 programs that met high standards for program design, implementation supports, evidence of effectiveness, and applicability to specific grades. To be included in the *2013 CASEL Guide* (CASEL, 2013) and be designated as SELect, the program had to meet the following three criteria: (a) be a well-designed classroom-based program that systematically promotes students' social and emotional competence, provides opportunities for practice, and offers multi-year programming, (b) deliver high-quality training and other implementation supports, including initial training and ongoing support to ensure sound implementation and, (c) be evidence-based with at least one

carefully conducted evaluation that documents positive impacts on student behaviour and/or academic performance. The *2013 CASEL Guide* summarizes objective information about the characteristics of these nationally available, multi-year programs via a "consumer report" format that is clear and easy to read. Included in the Guide is information on 23 programs identified as CASEL SELect programs. Of the 23, four programs target preschool-age children, 16 target children in elementary school (K-5), and three serve both preschool and elementary aged children.

259. Several findings emerged from the review by Malti et al. (2016). First, the authors found that while the majority of the programs demonstrated developmental differentiation between grades assessed, not one of the programs included developmental differences within grades with respect to empathy. Second, larger effect sizes were found in those programs implemented in earlier grades that targeted a larger number of empathy-related constructs. Third, none of the selected programs mentioned specific approaches that adjusted their curricula for possible developmental differences within grades, such as first screening children for their developmental level of empathy. Fourth, all of the programs reviewed demonstrated a modest impact in promoting three core areas of children's development: social-emotional competencies, conduct problems, and academic functioning. Fifth, those programs identified as targeting a greater number of empathy-related constructs were more effective in mitigating conduct problems and promoting academic functioning. Sixth, those programs that had an explicit focus on promoting empathy were not any more effective than those programs that did not have an explicit focus on empathy.

260. Malti et al. (2016) concluded that much more research is needed that explicitly identifies the causes for empathy development across childhood and adolescence. In order to determine the critical developmental periods when empathic capacity is most susceptible to an intervention, research is needed to identify if program effectiveness differs for types of empathy-related constructs targeted.

261. Some evidence supporting the malleability of empathy and its importance for promoting the health of adolescents is demonstrated in a recent study conducted by Schreier et al. (2013). To determine whether adolescents who help others

262. incur health benefits for themselves, the authors examined whether regular volunteering can reduce cardiovascular risk factors among adolescents attending an urban public high school in Western Canada via a Randomized Controlled Trial (RCT) in which half of 106 10th grade (15-year-old) students were assigned to a "volunteering" intervention group and the other half were assigned to a wait-list control group. Students in the intervention group were assigned to volunteer for 1 to 1.5 hours a week for 10 weeks at a nearby public elementary school with after school programs during the first semester of the school year. The types of programs offered during the after school hours in which the students volunteered included homework club, sports programs, science, cooking, cards and games, and arts and crafts.

263. Both at baseline and after the program had ended (post-test), cardiovascular risk was assessed on a range of measures: Body Mass Index (height and weight were measured, and body mass index was calculated as weight in kilograms

264. divided by height in meters squared), Inflammatory Markers (Interleukin 6 and C-reactive protein), and total cholesterol. Students also completed a battery of psychosocial measures assessing affect, self-esteem, and empathy-related constructs, including empathy and altruism.

265. Analysis indicated that there were no statistically significant differences between the volunteering group and the wait-list controls at baseline. Analysis for differences between groups at post-test showed that adolescents in the intervention "volunteering" group, compared to those adolescents in the wait-list control group, significantly reduced in their risk for cardiovascular disease. Specifically, adolescents who volunteered with elementary school children for 1 to 1.5 hours a week for 10 weeks

showed significantly lower interleukin 6 levels, cholesterol levels, and body mass index. With regard to the psychosocial measures, analysis indicated that those adolescents in the intervention group who decreased the most in negative mood, and increased the most in empathy and altruistic behaviours also showed the greatest decreases in cardiovascular risk over time. In other words, among those adolescents in the volunteer group, higher post-intervention empathic concern and altruistic behaviours were associated with lower levels of cardiovascular risk markers (adjusting for baseline values).

266.   Note that this is one of the first empirical studies to demonstrate that randomly assigning adolescents to weekly volunteering can change risk markers for cardiovascular disease. What is particularly significant about these findings is that they show that adolescent who engage in volunteering with elementary school children not only help others, but they also benefit themselves in relation to their cardiovascular health. Hence, interventions designed specifically to engage adolescents in volunteering with younger children provides an innovative way to improve the cardiovascular health of adolescents while simultaneously making positive contributions to society.

Executive Functions

267.   **Definition of *Executive Functions*:** Executive functions comprise three core domains: inhibition, working memory, and cognitive flexibility (Miyake et al., 2000). Inhibition can be categorized into two main components: response inhibition, commonly known as self-control, and interference control, which includes selective attention and cognitive inhibition (Posner and DiGirolamo, 1998). Working memory refers to the ability to keep information in mind in order to actively apply that information to a task at hand (Baddeley, 1992). It is goal or information maintenance, critical for knowing what to inhibit. It works the other way as well, in that, inhibition is needed to ignore environmental or internal distractions that will enable one to stay focused on the contents in one's working memory. Cognitive flexibility is the ability to take different perspectives, quickly alternate between tasks, or change directions if needed, and includes the ability to "think outside the box" (Davidson et al., 2006; Diamond, 2013). All three core domains support higher-order executive functions of reasoning, problem-solving, and planning (Diamond, 2013).

268.   **Constructs related to *Executive Functions*:** Executive functions have been used synonymously with similar but disparate terms including self-regulation, effortful control, and executive attention (Diamond, 2013). Self-regulation can be considered an umbrella term that encompasses both cognitive and behavioural processes enabling the regulation of one's emotions, motivation, and cognition needed for environmental adaptation (Blair and Diamond, 2008; Eisenberg, Hofer and Vaughan, 2007; Eisenberg, Spinrad and Eggum, 2010). Those who take a behavioural or temperament-based approach study effortful control, while those who come from a cognitive or neuroscience tradition focus on executive functions (Liew, 2012). Effortful control is defined as the natural ability to self-regulate, which appears early in development, is fairly stable throughout life, and is influenced by genes and the environment (Rothbart and Bates, 2006). Executive functions, on the other hand, are comparatively higher-order, develop later, and relatively responsive to training (Brocki and Bohlin, 2004; Diamond et al., 2007; Zelazo, Craik and Booth, 2004). Executive attention refers to selective attention or the top-down processes of attentional control (Posner and DiGirolamo, 1998).

269.   Self-control, self-discipline, and willpower have been used synonymously with self-regulation by some researchers who have defined self-control as the "voluntary regulation of attention, emotion, and behaviour in the service of personally valued goals and standards" (Baumeister, Heatherton and Tice, 1994; Duckworth and Seligman, 2005; Mischel et al., 2011). In other cases, self-control has been used in lieu of inhibitory control, which refers to the resistance of short-term temptations, and has been juxtaposed against grit, which refers to resistance of temptations over years (Duckworth and Gross, 2014; also see section on grit).

270.   A related but disparate construct to working memory is short-term memory, which refers to holding information in mind, but does not include the manipulation of that information (Diamond, 2013). For a review and framework on executive functions and the relationships between each component and similar constructs, see Diamond (2013).

271.   **Development of *Executive Functions* in the Life Cycle:** Compared to adults, inhibitory control is largely difficult for children, particularly between ages 4 to 9 (Davidson et al., 2006), but improves during adolescence reaching maturity at approximately ages 14 to 15 (Humphrey and Dumontheil, 2016; Luna et al., 2004), and declines again in late adulthood (Gazzaley et al., 2005). Working memory, on the other hand, is exhibited among children as early as infancy (Diamond, 1995) and gradually develops over a lengthened period of time into late adolescence reaching maturity at age 19 (Davidson et al., 2006; Luna et al., 2004), and declines again in late adulthood (Fiore et al., 2012). Cognitive flexibility, similarly can be demonstrated by toddlers (Brooks et al., 2003), improving progressively during childhood into late adolescence (Humphrey and Dumontheil, 2016), and declines again in late adulthood (Kray, 2006).

272.   Executive functions are critical for nearly every stage of development and every aspect of life, including school readiness (Blair and Razza, 2007), academic achievement (Duckworth and Seligman, 2005; Gathercole et al., 2004), peer relationships (Holmes, Kim-Spoon and Deater-Deckard, 2016), mental health (Eisenberg et al., 2009; Lui and Tannock, 2007; Taylor Tavares et al., 2007), physical health (Best, Miller and Naglieri, 2011; Crescioni et al., 2011; Miller, Barnes and Beaver, 2011; Verdejo-García et al., 2010); employment (Bailey, 2007); marriage (Eakin et al., 2004), and are negatively affected by environmental conditions (Duckworth, Kim and Tsukayama, 2013; Kidd, Palmeri and Aslin, 2013; Miller et al., 2015).

273.   Longitudinal studies found that executive functions as measured in childhood predicted executive function-related issues (Friedman et al., 2007), scholastic achievement, social-emotional competence in adolescence (Mischel et al., 2011), substance abuse, financial management skills, criminal behaviour in adulthood (Moffitt et al., 2011), which speaks to the importance of improving executive functions in the early years. Yearlong longitudinal studies conducted during adolescence found self-control to be a better predictor than IQ for hours of study, completed homework, classroom behaviour and GPA (Duckworth, Quinn and Tsukayama, 2012; Duckworth and Seligman, 2005).

274.   **Evidence of Malleability of *Executive Functions*:** Research examining the efficacy of intervention programs designed to improve executive functions is still emerging with mixed findings, with far more research having investigated its malleability among children than adolescents. Among children, research suggests computer-based training (Holmes, Gathercole and Dunning, 2009), social-emotional learning programs (e.g., PATHS; Riggs et al., 2006), and contemplative practices (e.g., mindfulness; Flook et al., 2010; and traditional martial arts; Lakes and Hoyt, 2004) can improve executive functions (for a review, see Diamond, 2012; Diamond and Lee, 2011).

275.   Only a few programs have emerged as being efficacious for promoting executive functions in adolescents. Specifically, the Cogmed computerized working-memory training was found to improve working memory among early adolescents (8-11 years old; Holmes, Gathercole and Dunning, 2009). Similarly, girls aged 13 who engaged in yoga witnessed an improvement in executive functions compared to those who engaged in physical activity as usual (Manjunath and Telles). Movement-focused video games have also been found to improve overweight adolescent short-term executive function skills, which also led to significant weight loss (Staiano, Abraham and Calvert, 2012). In populations clinically diagnosed with attention deficits where there is comparably far more research, a meta-analysis found that executive function training has been found to be more effective for children than adolescents, but the training effects were not retained at follow-up, nor were they transferable to other contexts (Melby-Lervåg and Hulme, 2013; Riccio and Gomes, 2013). A recent meta-analysis also concluded that there is no

definitive causal link between school-based interventions targeting executive functions and improved academics among non-clinical populations of children and adolescents (Jacob and Parkinson, 2015). These findings illustrate the need for substantially more research in this area Diamond (2015) has hypothesized that for executive functions interventions to be effective, they must be designed for the promotion of physical activity or movement, but must also challenge executive functions. To date, this theory has not yet been empirically tested.

Grit

276.   **Definition of *Grit*:** Grit is defined as perseverance combined with a deep desire to achieve long-term goals, and involves persisting in the face of challenges, maintaining one's effort and interest regardless of any failures or adverse circumstances that may occur (Duckworth et al., 2007). The instrument developed to measure this construct, called the Grit Scale, is composed of two primary constructs, perseverance and consistency (Duckworth et al., 2007).

277.   **Constructs related to *Grit*:** Grit is related to the personality facet of conscientiousness, but the two constructs differ in grit's emphasis of long-term goals and persistence in the face of challenges (Duckworth and Quinn, 2009). In a recent critique of grit, however, Credé, Tynan and Harms (2016) argue that grit appears to suffer from the "jangle" fallacy, or the belief that two things are different because they are labelled differently (Kelley, 1927). Since the grit and conscientiousness are highly correlated, they propose the two constructs are the same thing, or at least the same as one of the personality facets of "achievement striving" or "industriousness" (Credé, Tynan and Harms, 2016).

278.   Another facet of conscientiousness is self-control or self-discipline, which are similar to the construct of grit. Duckworth and Gross (2014) define self-control as the ability to inhibit an impulse that is more momentary, while grit focuses on more superordinate goals often over years or decades. Further research, however, is needed to disentangle the associations between grit and conscientiousness.

279.   Lastly, grit is related to perseverance and consistency, which combined form the construct's definition. The developers of the scale, however, found that the two items together are better predictors of achievement than each alone (Duckworth et al., 2007).

280.   **Development of *Grit* in the Life Cycle:** The development of grit gradually increases with age, and may be largely absent in childhood, as the formation of a deep interest or passion may not occur until later in development (Credé, Tynan and Harms, 2016). Given grit's strong correlation with conscientiousness, an examination of the personality research literature indicates conscientiousness is still developing in the childhood years (Allik et al., 2004), as found in the unstable relationship strength between grit and other constructs in childhood that are normally quite stable once adolescence is reached (Poropat, 2014).

281.   Grit becomes important in the context of adolescence, as research has found it to be highly predictive of high school graduation and college GPA (Duckworth et al., 2007), retention at a competitive military academy (Duckworth and Quinn, 2009), job retention and marriage (Eskreis-Winkler et al., 2014), and memory in late life (Rhodes et al., 2016). Duckworth (2013) suggests grit is a stronger predictor of success than cognitive ability. Longitudinal studies are currently underway to see how grit as measured during adolescence is related to performance in adulthood.

282.   **Evidence of Malleability of *Grit*:** Since the construct of grit has only emerged in the past decade as a topic of scientific interest, there has been very little research into whether it is malleable. Researchers have considered its potential, given the growing number of successful social and emotional competency and mindset interventions developed to promote non-cognitive factors (Credé, Tynan and Harms, 2016;

Durlak et al., 2011; Paunesku et al., 2015). One emerging program among charter schools is the Knowledge is Power Program, which trains teachers to promote grit in their students and has demonstrated its potential to improve academic outcomes (Shechtman et al., 2013).

283.   Nonetheless, some researchers note grit may not always be beneficial; in certain contexts, it can harm one's psychological health or impede one's learning and ability to stay in school, as seen in circumstances where grittiness is motivated extrinsically, e.g., by fear of failure in the face of high stakes testing and college admissions (Shechtman et al., 2013). In a recent article in *The New Yorker*, Denby (2016) argues grit does not account for other important aspects of character that should be fostered or for the socio-economic backgrounds of children; focusing on grit is not reflective of the kind of people we would like our children to become.

Implicit theories (Mindset)

284.   **Definition of *Implicit Theories*:** Implicit theories are defined as the underlying assumptions that individuals have about the self and others (Dweck and Leggett, 1988). These are "implicit" because they are often not made explicit, and yet they are a person's lay explanation for events that occur in everyday life (Molden and Dweck, 2006). There are two primary theories or mindsets that individuals have about intelligence: The entity theory of intelligence is the perspective that intellectual ability is fixed, static, innate, or natural, and there is no possibility for change. The incremental theory of intelligence, on the other hand, sees intellectual ability as something that can be developed or improved over time (Dweck and Leggett, 1988). These theories also extend to personality as well: Individuals can see the socially relevant attributes of others as fixed or as having the potential for change (Chiu, Hong and Dweck, 1997). Such theories are related to self-regulatory processes that include goal setting (performance vs. learning goals), goal operating (helpless-oriented vs. mastery-oriented strategies), and goal monitoring (negative emotions vs. expectations) (Burnette et al., 2013).

285.   **Constructs related to *Implicit Theories*:** Implicit theories are directly related to motivation, whereby individuals who are extrinsically motivated adopt an entity or fixed mindset, and those who are intrinsically motivated endorse an incremental or growth mindset (Haimovitz, Wormington and Corpus, 2011; see section on motivation).

286.   **Development of *Implicit Theories* in the Life Cycle:** Implicit theories begin to form when parents and teachers provide feedback to their children or students. Mueller and Dweck (1998) demonstrated that fifth grade students who were praised for being "smart" led those students to endorse an entity theory of intelligence and show lower levels of resilience in the face of setbacks in school.

287.   Implicit theories become important in the context of adolescence, when individuals are likely to struggle, such as in middle school and high school, where scholastic content becomes more challenging and one's social circles become more unstable. This is particularly relevant for adolescents entering middle school and other transitional periods, where mindsets can have an impact on academic achievement (Paunesku et al., 2015), social competence (Yeager, Trzesniewski and Dweck, 2013), athletics (Ommundsen, 2003), and resilience (Yeager and Dweck, 2012).

288.   **Evidence of Malleability of *Implicit Theories*:** Research has found implicit theories or mindsets to be malleable through mindset interventions that generally include two components: (1) Instruction about brain physiology and the malleability of intelligence (e.g., each time you struggle, the brain creates more connections, which makes you smarter) (Blackwell, Trzesniewski and Dweck, 2007), (2) Writing a letter to a younger student about what they just learned to internalize the message (Aronson, Fried and Good, 2002).

289.   Nonetheless, interventions to alter such beliefs may not be effective until individuals feel challenged and success is hard to reach (Grant and Dweck, 2003). Intervention messages must also be tailored to the specific target age and context with input from focus groups. The question that remains is whether intervention effects that emerge in one context will transfer to another, such as at home (Yeager and Dweck, 2012).

Motivation

290.   **Definition of *Motivation*:** Motivation is defined as the reason one has for behaving in a certain way or the willingness to do something (Ryan and Deci, 2000). Researchers have generally categorized motivation by placing them at two ends of a spectrum. At one end, *intrinsic motivation* refers to engagement in an activity because one finds the activity inherently interesting, enjoyable, and satisfying. At the other end of the spectrum is *extrinsic motivation*, which refers to engaging in an activity because it leads to a reward, incentive, or some other outcome (e.g., avoidance of punishment, praise, high score, money, etc.). Just outside the spectrum is *amotivation*, which refers to behaviour that lacks any intention at all.

291.   Ryan and Deci (2000) provide an explanation for these motivational mechanisms in their Self-Determination Theory (SDT), which breaks up extrinsic motivation into subcategories based on the amount of perceived autonomy an individual has in determining whether or how to engage in an activity. *External regulation*, the least autonomous form of extrinsic motivation, arises from a need to meet some external contingency or to obtain an external reward. *Introjected regulation* refers to motivations that arise from pressure to perform in order to avoid feeling guilty or anxious or to boost one's ego or pride. *Identification,* a more autonomous form of extrinsic motivation, occurs when an individual identifies with the behaviour's importance. *Integrated regulation*, the most autonomous form of extrinsic motivation, occurs when the behaviour has been fully assimilated with the self, and matches one's values and needs.

292.   According to SDT, people are naturally self-motivated, interested, vital and active because success itself is rewarding (Deci and Ryan, 2008b), however contextual factors of autonomy and belonging play a role in maintaining this intrinsic motivation. Other models place motivation within a hierarchy that is influenced by social factors that are global, contextual or situational (Vallerand, 1997), and some add the importance of meaningful learning (Brophy, 1999).

293.   Research has also found that external rewards, whether contingent on task engagement, completion, or performance quality, undermine intrinsic motivation (for a meta-analysis, see Deci, Koestner and Ryan, 1999). In situations where both are present – intrinsic motivation and external rewards – a recent meta-analysis found the relative importance of each depends on the type of performance required (Cerasoli, Nicklin and Ford, 2014). For performance that is more structured, repetitive, less complex, external rewards are the chief driver for performance. For performance that is more complex where quality is needed – requiring task absorption, autonomous work, use of personal resources, and an open mind, intrinsic motivation becomes the primary predictor.

294.   **Constructs related to *Motivation*:** Motivation is directly related to implicit theories, whereby individuals who are extrinsically motivated adopt an entity or fixed theory of intelligence, and those who are intrinsically motivated endorse a more incremental or growth theory of intelligence (Haimovitz, Wormington and Corpus, 2011; see section on implicit theories).

295.   **Development of *Motivation* in the Life Cycle:** In terms of development, the types of behaviours or values that can be integrated with the self-increase as a function of an individual's cognitive and ego capacity, which are based on one's developmental stage (Chandler and Connell, 1987). Over time,

individuals also have a tendency to internalize behaviours not found to be initially preferential (Ryan and Deci, 2000).

296.   Motivation becomes particularly critical during the period of adolescence as the need to engage in behaviours that aren't inherently interesting increase in the context of the school environment; therefore, motivation tends to decrease upon the transition to high school (Stroet, Opdenakker and Minnaert, 2015). Decades of research have tied motivation to learner-centred teacher-student relationships (Cornelius-White, 2007), teacher's support (Stroet, Opdenakker and Minnaert, 2015), classroom structures (Ames, 1992; Greene et al., 2004), school belonging (Gillen-O'Neel and Fuligni, 2013; Goodenow and Grady, 1993), positive attitudes towards school (Green et al., 2012), and psychological well-being (Deci and Ryan, 2008a).

297.   **Evidence of Malleability of *Motivation*:** Considering the majority of activities adolescents are asked to engage in are not inherently interesting, educational researchers have extensively studied the ways to motivate adolescents to become more interested in school. The extant literature indicates that, fortunately, motivation is malleable. Interventions that assist teachers to change their instructional practices in accordance with Self-Determination Theory, by increasing autonomy, belonging, competence (Cheon and Reeve, 2015), and meaningfulness (Turner et al., 2014) have been found to be effective. After-school programs have also been found to improve school engagement (Clanton Harpine, 2013; Grolnick et al., 2007). Even parents can motivate their children to take a course by instilling the value it has for future career goals (Harackiewicz et al., 2012).

298.   Research into motivation's generalizability is still in its infancy. Hagger and Chatzisarantis (2016) have put forth the trans-contextual model to determine if increased motivation in one setting can generalize to other settings, but evidence for its application is still emerging, with a few studies showing empirical support for the model's premises (e.g., Hagger et al., 2015).

Optimism

299.   **Definition of *Optimism*:** Scheier and Carver (1985) first introduced this expectancy model to the field of psychology, and have studied the benefits of this construct extensively. In this theory, optimism is defined as a stable individual disposition that reflects the general tendency to expect positive outcomes about one's future (Gillham and Reivich, 2004; Scheier and Carver, 1985).

300.   **Constructs related to *Optimism*:** The similar but related constructs of hope (Snyder, 2002) and self-efficacy (Bandura, 1997) differ from optimism because they focus on personal agency as the primary determinant of positive outcomes or are typically situation-specific. For instance, those who are optimistic may feel confident that they will do well either because of their own ability, social support, or through pure luck (Alarcon, Bowling and Khazon, 2013; Gillham and Reivich, 2004). In contrast, hope is more concerned with the actions one intends to engage in to produce successful outcomes for oneself (Gallagher and Lopez, 2009). Similarly, self-efficacy focuses on individual actions but rather than an intention, and refers to the capacity to carry out one's goals (Snyder, 2002).

301.   **Development of *Optimism* in the Life Cycle:** There has been relatively little research into the origins and development of optimism, although some research has examined the role of authoritative parenting style in promoting optimism through two mechanisms – the development of trust when caregivers respond consistently to needs, and by way of modelling behaviour and reinforcement from parents and other caregivers (Jackson et al., 2005). A marked lack of studies have examined age differences in dispositional optimism among children and adolescents, with only one thus far finding optimism gradually increases from age 9 to 18 (Zou et al., 2016).

302.   Optimism is particularly important developmentally as longitudinal research has found that qualities related to resilience, such as optimism, often emerge in childhood and continue into the adult years (Masten and Tellegen, 2012), remaining stable across time in the absence of a major life event (Carver, Scheier and Segerstrom, 2010). Research on optimism in adults have found it to be beneficial across a great number of life domains, including mental health (Patton, 2011), physical health (Tindle et al., 2009), relationships (Neff and Geers, 2013) and career success (Segerstrom, 2007), as demonstrated in prospective, longitudinal studies (for a review, see Carver and Scheier, 2014; Malouff and Schutte, 2016).

303.   Although still in its nascent stages, the limited studies that have been conducted to date among adolescents reflect similar advantages as those found among adults. To illustrate, optimism has been associated with greater achievement motivation (Schulman, 1995), greater number of career related goals (Creed, Patton and Bartrum, 2002), a greater likelihood of acceptance by peers among adolescent girls (Oberle, Schonert-Reichl and Thomson, 2010), greater life satisfaction (Oberle, Schonert-Reichl and Zumbo, 2011), as well as greater perceived parental support and school connectedness (Thomson, Schonert-Reichl and Oberle, 2015). Optimism is a particularly important trait during the adolescent years as it can act as a potential buffer against depressive symptoms or sadness that may emerge, underscoring the importance of promoting it in the years before this vulnerable stage (Hernandez and Carrillo, 2010; Jackson et al., 2005; Nolen-Hoeksema, Girgus and Seligman, 1992).

304.   **Evidence of Malleability of *Optimism*:** Due to the impact that optimism has on many areas of life, researchers have examined the ways in which to increase optimism, mainly among adults (Meevissen, Peters and Alberts, 2011); few, however, have examined how to boost it among younger populations. In consideration of the risk that early adolescents have for developing depression, cognitive-behavioural therapies have been found to significantly reduce the rates of onset. Universal programs with components that increase optimism, including the Penn Resiliency Program or adaptations of it have found increases in optimism (Gillham and Reivich, 1999; Tak et al., 2015), by teaching adolescents to be aware of one's thoughts, recognizing negative thoughts, challenging them, and then learning how to transform them into more realistic, positive ones. Mindfulness-based social and emotional learning program have also been found to increase optimism (Schonert-Reichl et al., 2015), but no effects were found for children with cancer (Shoshani, Mifano and Czamanski-Cohen, 2016). The long-term effects of these interventions are not clear (Malouff and Schutte, 2016), as some effects have not sustained at follow-up (Johnstone et al., 2014; Tak et al., 2015). Since optimism is considered to be a personality trait, it may not be so simple to change a person's overall outlook on life (Carver and Scheier, 2014).

Self-Awareness

305.   **Definition of *Self-Awareness*:** Self-awareness refers to the capacity an individual possesses for introspection and the ability to recognize that he/she is separate from the environment and other individuals (Miriam-Webster). Self-awareness also includes the ability to accurately recognize how thoughts, feelings, and actions are interconnected, including the capacity to accurately assess one's strengths and limitations, and have a positive mind-set, a realistic sense of self-efficacy, a well-grounded sense of confidence and optimism, and an understanding one's emotions, personal goals, and values (CASEL, 2013).

306.   **Constructs related to *Self-Awareness*:** Other constructs related to self-awareness include meta-cognition, self-management, self-consciousness, self-compassion, identity, self-concept, and self-efficacy.

307.   **Development of *Self-Awareness* in the Life Cycle:** Some have argued that self-awareness is critical from both an evolutionary and developmental perspective (Rochat, 2003). Self-awareness first emerges around 18 months of age when toddlers develop the capacity to discover themselves and are able recognize their own reflection in a mirror. Around 24 months, toddlers begin to be able to observe and relate their own experiences to those around them, yet describe themselves in very concrete, observable

characteristics (e.g., I have brown hair) and overt abilities or activities (e.g., I am a good runner). As they enter school, children's self-awareness begins to take the form of developing their own interests including likes and dislikes. During middle childhood there is a move to describing the self more in terms of inner, psychological characteristics (e.g., I am a person who gets angry easily) and comparison to others (e.g., I am the worst speller in my class) (Harter, 1998). As children develop a more coherent sense of themselves as separate individuals, their cognitive capacities provide them with the capacity to take the perspectives of others and identify when those perspectives are different from their own. In adolescence, as individuals move from concrete to abstract thinking, adolescents have the ability to possess a more integrated sense of self in relation to others and a heightened self-awareness.

308.   From a cognitive-development perspective (Piaget, 1962), as adolescents develop the capacity to see oneself as separate from others coupled with the ability to take the perspective of others, has been theorized to lead to a heightened sense of self-consciousness. Elkind (1967) introduced two constructs–the imaginary audience and the personal fable–as an attempt to describe the egocentric thinking utilized by the typical adolescent (Elkind and Bowen, 1979). The theory proposed that the progression from concrete to abstract thinking was accompanied with a temporary state of distorted thinking about self and others. Elkind (1967) developed the construct of the "imaginary audience" as a way in which to illustrate an adolescent's expectation that he or she is the central focus of any social situation and that the audience's viewpoint parallels whatever view the adolescent holds. According to Elkind (1967), an adolescent's "personal fable" emerges from this self-focus. Although most research has not supported the original theoretical notion that adolescent egocentrism represents faulty social cognition (Vartanian, 2000, 2001), this construct has provided a useful lens in which to understand the increases in problem behaviours that occur during adolescence (e.g., delinquency, unplanned teen pregnancy) (Elkind, 1985). Note that some have argued that the constructs of self-awareness and self-management are more salient in individualistic cultures (Hecht and Shin, 2015).

309.   **Evidence of Malleability of *Self-Awareness*:** Evidence of the malleability of self-awareness has been demonstrated across several studies. A range of cognitive behavioural interventions and mindfulness interventions has shown increases in adolescents' abilities to develop skills associated with self-awareness, such as self-management and optimism (Durlak et al., 2015). With regard to mindfulness interventions, the malleability of self-awareness and related constructs has been demonstrated in evaluations of the *MindUP Program* - a comprehensive classroom-based program for children from pre-Kindergarten to 8th grade aimed at fostering children's social and emotional competence, psychological well-being, and self-regulation while decreasing acting-out behaviours and aggression. The MindUP program was designed to enhance children's self-awareness, social awareness, focused attention, self-regulation, problem solving, prosocial behaviours, and positive human qualities, such as happiness, optimism, and altruism. The curriculum is theoretically-derived and informed by the latest scientific research in the fields of cognitive neuroscience, mindfulness-based stress reduction, social and emotional learning (SEL), and positive psychology (Seligman and Csikszentmihalyi, 2000). Further, the MindUP Program was developed as an approach to teaching, as opposed to a curriculum that is separate from other subject areas. In other words, MindUP's curriculum has been designed expressly to assure that it does not compete or conflict with existing lesson plans, but can be easily integrated with them. There are daily which consist of deep belly breathing and attentive listening to a single sound (i.e., a resonating instrument) which are central to the program with the intention of enhancing children's self-awareness, focused attention, self-regulation, and stress reduction. The program consists of 15 lessons grouped into four Units:

I) Let's Get Focused!
    1.   Learning How Our Brains Work;

    2.   Understanding Mindful Attention;

3. Focusing Our Awareness: The Core Practices;

II) Paying Attention to Our Senses
4. Mindful Listening;

5. Mindful Seeing;

6. Mindful Smelling;

7. Mindful Tasting;

8. Mindful Moving I;

9. Mindful Moving II;

III) It's All About Attitude
10. Perspective Taking;

11. Choosing Optimism;

12. Savouring Happy Experiences; and

IV) Taking Action Mindfully
13. Acting with Gratitude;

14. Performing Acts of Kindness;

15. Taking Mindful Action in Our Community

310. To date, there are two experimental studies examining the effectiveness of the MindUP program with early adolescents (Schonert-Reichl and Lawlor, 2010; Schonert-Reichl, Oberle, Lawlor, Abbott, Thomson, Oberlander and Diamond, 2011). For the first one, a quasi-experimental, pre-test/post-test, control group design was used to evaluate the MindUP program (formerly called the Mindfulness Education program) among 246 4th to 7th grade students drawn from 12 classrooms. Six MindUP program classes were matched with six comparison classes where the average age, gender, and race/ethnicity of the class was equivalent. Results revealed that young adolescents who participated in the MindUP Program, compared to those who did not, showed significant improvements on teacher rated attention and social competence, and decreases in aggressive / dysregulated behaviour in the classroom. In addition, children in the MindUP program self-reported greater optimism and mindful attention than those not in the program. The skills and strategies of MindUP help children become more optimistic and willing to face the challenges they encounter in school and elsewhere. The second study (Schonert-Reichl et al. (2011) both replicated and extended the findings of the previous study showing significant improvements in children's optimism, empathy, emotional control, attention, self-concept, and prosocial behaviours in the classroom.

4.5 Conclusions and Future Directions

311. As current global conditions unfold, it is becoming increasingly evident that what is needed is a redesign of educational systems to include a focus on the promotion of academic achievement and cognitive skills that is coupled with intentional and explicit attention to efforts to foster a range of social and emotional skills, such as empathy, creativity, executive functions, grit, motivation, problem solving, critical thinking, communication, collaboration, and self-awareness.

312.   Although much has been learned in the past decade about the malleability of students' knowledge, skills, attitudes, and values and the importance of these constructs in predicting success in school and in life, the field has further to go before firm conclusions can be made about the specific ways in which these construct advance children's short-term and long-term development. Indeed, many questions still remain regarding the ways in which programs and practices designed to promote the knowledge, skills, attitudes, and values can forecast children's future success. For example, what are the processes and mechanisms that lead to successful improvements in children's social and emotional competence across programs? Which programs work best for which children? And under what conditions is optimal development fostered?

313.   One of the biggest challenges that confronts the field of education for 2030 is the translation of knowledge garnered from rigorous research on the effectiveness of programs into policy and widespread practice (Greenberg, 2010; Shonkoff and Bales, 2011). Clearly, there is a need for greater efforts to translate science for practice and policy so that approaches supported by science can be better integrated into schools and communities. Such efforts can help build the processes and structures needed to foster high-quality implementation and promote sustainability (see Elias, Zins, Graczyk, & Weissberg, 2003).

314.   Greater collaboration between researchers and educators is also needed so that research not only informs practice but is also informed by it. Indeed, to create a world characterized by the optimal skills, attitudes, and values that bring success to all children across diverse cultures across the globe, it is essential that educators, parents, community members, and policy makers work in concert to achieve long-term change. In today's complex society, special care needs to be taken to encourage and assist young people to reach their greatest potential and to flourish and thrive. It is therefore critical that intentional efforts be made to devise the most effective preventions and educational practices that promote success in all students. Such efforts must be based on strong conceptual models and sound research. Only then will the advancement of the development of the world's children and youths be possible.

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Section IV: Malleability on Key Constructs for 2030

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