



# Cognitive and non-cognitive learning factors

A literature review  
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## Context

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Katherine Poynton

This literature review was written by Katherine Poynton. Katherine graduated from the Human Development and Psychology program at Harvard Graduate School of Education in 2014. She has a broad background working within the field of education, primarily as a teacher and school psychologist.

Since graduating from the Masters program, Katherine has been gaining experience as an educational researcher forming partnerships with schools based in the United States and United Kingdom. These various research projects have centred around identifying practices and interventions within the school context that can assist students in becoming more successful learners. Her other research interests extend to developing more effective ways to build supportive and trauma-informed schools.

This literature review represents an important part in the action research process, used by the Centre for Inspiring Minds (cim) and its project teams. It exemplifies our commitment to working with outside researchers to develop research-informed approaches to improving teaching and learning and supporting school development. This literature review was developed in support of cim's Advocacy for Student Learning project, led by Laura Mullertz.

Laura is a high school student at ACS Cobham International School. She initiated her research project in partnership with the Centre for Inspiring Minds in March 2014. The project aims to support grade nine students by building a systematic awareness of factors that shape academic behaviours and prepare students to become empowered advocates for their own learning. When she completes the International Baccalaureate Diploma Programme in June 2016, Laura plans to study Psychology.

Benedict Hren  
Head of the Centre for Inspiring Minds  
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**The Centre for Inspiring Minds**  
ACS International Schools  
West Lodge  
Portsmouth Road  
Cobham, Surrey  
KT11 1BL  
England

## Introduction

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Within the sphere of educational research, there is ongoing debate and consideration given to how to improve outcomes for young people and provide the support that is required for them to achieve success throughout their schooling and into the future (Bill & Melinda Gates Foundation, 2011). This has led to an increasing shift towards establishing more innovative, non-traditional ways of supporting students and thinking about their learning pathway (Bill & Melinda Gates Foundation, 2011).

Historically, research has focused primarily on the association between cognitive skills and academic outcomes such as, grades and test scores (Rosen, Glennie, Dalton, Lennon, & Bozick, 2010). This construct has been considered a central factor to student achievement, and defined as something that is largely inheritable and unchangeable (Farkas, 2003).

However, more recently, there has been an expansion upon this viewpoint to include non-cognitive factors and their role in the learning process (Farkas, 2003; Heckman & Rubenstein, 2001). It has become apparent that cognition forms one component of a much more complex picture, and researchers are beginning to consider how cognitive and non-cognitive factors can each contribute in distinctive, and interactive ways to the learning process (Carneiro, Crawford, & Goodman, 2007; Duckworth, 2009; Farrington et al., 2012; Farkas, 2003).

More specifically, research has started to investigate the relationship between non-cognitive attributes and academic outcomes in young people, and how this may contribute to continued success through life (Rosen et al., 2010). These attributes begin to develop throughout childhood and adolescence, and are described as being the skills and characteristics that reflect an individual's personality, motivational habits, and attitudes (Rosen et al., 2010).

Non-cognitive attributes help a young person to function effectively within the school setting and may include characteristics such as, motivation, perseverance, self-regulation, and conscientiousness (Rosen et al., 2010). Many of these skills and attributes are also considered to be malleable and responsive to the surrounding environment (Farrington et al., 2012; Heckman & Rubenstein, 2001). When fostered and developed from an early life stage, non-cognitive skills and attributes can serve an important function and may be utilized to help improve cognitive development, academic achievement, learning, and life outcomes (Heckman & Rubenstein, 2001; Rosen et al., 2010).

Evidence also suggests that the development of non-cognitive skills throughout these formative years can have implications for future learning and life experiences (Heckman & Rubenstein, 2001; Rosen et al., 2010). For example, in considering the transition to college, there is an expectation that students will be prepared to independently adjust to college life, manage the increased level of rigor, and be equipped with the skills required to succeed (Bill & Melinda Gates Foundation, 2011; Conley, 2003; Conley, 2007). This extends beyond the

traditional focus on content knowledge, achievement, and grades attained at the high school level (Conley, 2003; Conley, 2007).

In addition to these factors, college readiness is now being considered in terms of a range of cognitive and non-cognitive skills that are described as being more important for student success (Conley, 2007). These skills include an ability to analyze, interpret, problem solve, reason, think critically, and complete work with accuracy (Conley, 2003; Conley, 2007). This is also reflected through demonstrating a commitment to intellectual development, completing work tasks independently, accepting feedback, preparing for possible failures, as well as remaining engaged and motivated to learn (Conley, 2003; Conley, 2007).

Throughout this transition, students are also expected to be self-reliant, recognize when they need to reach out to others for help, and actively seek this support (Conley, 2007).

Given the number of significant changes that occur when shifting between high school and college, this places responsibility on the school setting to ensure that there is an emphasis on preparing students for the academic, social, and cultural shifts that occur when transitioning to college life (Conley, 2007). There must also be a commitment to building teacher capacity to support students to develop a deeper awareness of the learning process, their own learning preferences, to take responsibility for their learning, and believe in their ability to achieve success in college (Conley, 2007). At a systemic level, this also calls for more formalized programs to be implemented throughout the high school years to develop each student's capabilities across each of these areas (Conley, 2007).

In addition to preparing young people for success throughout their college years, there is also evidence emerging to suggest that the development of non-cognitive factors and associated work habits lead to greater effectiveness and productivity within the workplace (Farkas, 2003; Heckman & Rubenstein, 2001; Rosen et al., 2010).

These skills are also identified as being more desirable and valuable to employers (Farkas, 2003). Within the workplace context, this may include behaviors and characteristics such as, conscientiousness, perseverance, tenacity, leadership, sociability, trustworthiness, being organized, regular attendance, being effortful, and openness to experience (Farkas, 2003; Heckman & Rubenstein, 2001).

This has also led to a focus on the important role schools can play in providing support and intervention to instill the values, habits, and behaviors that will become assets and lead to successful outcomes throughout a young person's working life (Farkas, 2003). This also places an emphasis on forming the foundation throughout the years of schooling, and continuing to develop these skills across the entire life span (Farkas, 2003).

Furthermore, there is also research emerging to indicate a relationship between non-cognitive factors developed earlier in life, and health outcomes evident throughout adulthood (Heckman & Rubenstein, 2001; Kaestner, 2009). Overall, research into the categorization and role of non-cognitive factors is considered to be an important and emerging field (Heckman & Rubenstein, 2001).

## **Non-cognitive Factors and Academic Performance**

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### **A Definition and Summary of the Key Categories**

In a recent paper prepared by Farrington et al. (2012), the authors provide a comprehensive review of the literature relating to the role of non-cognitive factors in shaping learning and academic performance throughout adolescence. The emerging research highlights that an important component to promoting and enhancing academic performance is the development of non-cognitive factors. These factors are reflected through a student's attitudes, strategies, skills, and behaviors that are not measured through grading, scores, and standardized testing.

What has now been established is that, in addition to acquiring content knowledge and academic skills, students also need to be supported to enhance their capacity to learn. This can be achieved through explicitly teaching students the skills they need to achieve success and interact with the learning environment in a more positive and meaningful way.

Therefore, academic performance is an outcome that is affected by a range of factors that are both intrinsic to the individual learner, and apparent within the context of their environment.

In drawing together the findings from the literature review, the various non-cognitive skills and attributes were categorized into five areas including:

- academic behaviors,
- academic perseverance,
- academic mindsets,
- learning strategies, and
- social skills.

Many of these factors are considered to be interdependent, and interact to affect a student's academic success. From the perspective of intervention within the school context, what holds much promise is that many of these attributes and behaviors are considered to be malleable and conducive to change. Therefore, students can be supported and explicitly taught how to develop across many of these areas that are critical to academic performance.

### **Academic Behaviors**

Academic behaviors are reflected through the visible and observable signs that a student is engaged and being effortful with their learning. This includes behaviors such as, going to class, being attentive, arriving to class with all the

required materials, being organized, participating in classroom activities, committing to studying outside of school hours, and completing homework tasks.

Academic behaviors are relatively easy to observe, monitor, and measure. These behaviors are considered to be the closest in proximity to overall academic performance, with all other non-cognitive factors working through these behaviors to influence student performance. Academic behaviors directly relate to how well a student performs in class and have a significant influence on achievement.

### **Academic Perseverance**

Academic perseverance is based on a range of psychological concepts that form the foundation for understanding a student's ability to set goals, stay focused, and work towards educational attainment. This is reflected through being thorough and timely with work tasks, working to the best of one's ability, avoiding distractions, and overcoming obstacles and challenges.

The level of perseverance is demonstrated through a student's ability to remain focused on a goal despite the obstacles that may be faced, also known as grit or persistence, and prioritize these pursuits over other interests. This also requires a commitment to putting in additional hours of study, mastering a skill and/or subject area, and working towards achieving more long-term educational goals.

### **Academic Mindsets**

Academic mindsets are the beliefs and attitudes that a young person holds in relation to their academic work. When a student has a positive academic mindset, they are more likely to be motivated to learn, persistent with their work, and demonstrate perseverance.

This is also believed to have a direct relationship to improved academic behaviors and academic performance. There is a strong interconnectedness between each of these factors, and the reverse also applies whereby strong academic performance serves to reinforce positive mindsets, perseverance, and academic behaviors. In contrast, when a student develops a negative mindset this can create a cycle of decreased perseverance, academic behaviors, and academic performance.

The literature indicates that students can be supported to develop a positive academic mindset through four key areas including:

- establishing a sense of connectedness and belonging within the school community,
- holding a belief that their own abilities can change and grow through effort,
- believing in their own ability to succeed, and
- finding value in the subject areas and work tasks that they are required to do.

## **Learning Strategies**

Learning strategies are the processes that a student can draw upon to engage with the cognitive tasks of thinking, remembering, and/or learning. This includes the domains of study skills, metacognition, self-regulation, and goal-setting.

Specific strategies can assist students with recalling information, monitoring their own understanding of content, detecting when they are confused, and self-correcting errors in thought processes. Through developing and applying effective learning strategies, students can then draw upon effective academic behaviors to maximize their learning.

## **Social Skills**

Social skills focus on the interpersonal qualities of a student and the behaviors that facilitate social interactions with others. In addition to improving interactions with peers and teachers within the school context, social skills are also considered to be an important component of future work and life outcomes.

This can include qualities such as, communication skills, problem solving, empathy, working cooperatively with others, being assertive, and taking responsibility. Within a classroom context, this may be reflected more directly through working cooperatively in groups, contributing appropriately to classroom discussions, and collective problem solving.

Social skills have been found to have an indirect impact on academic performance, and are primarily expressed through students' behaviors at school.

## **Supporting Student Transition from Middle to High School**

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### **Fostering the Development of Non-cognitive Factors**

Adolescence is a life stage where a young person experiences a multitude of changes (Crockett, Peterson, Graber, Shulenberg, & Ebata, 1989). These changes relate not only to the physical, cognitive, and emotional development that occurs, but also extends to the social and environmental contexts that a young person may find themselves engaging in (Crockett et al., 1989; Eccles, Lord, & Midgley, 1991; Eccles, Midgley, & Adler, 1984).

Within the school setting, adolescents are required to adjust to a number of changes within the learning environment when transitioning both to, and from middle school. This may be represented by changes such as, increasing school and class sizes, more frequent transitions between classes, interacting with different teachers, less personal interactions with teachers, increased teacher control, different work expectations and grading practices, differing peer groups, finding one's place amongst the learning and social contexts, and adjusting to a more formalized school environment (Crockett et al., 1989; Eccles et al., 1991; Eccles et al., 1984).

Research indicates that these transitional periods may be marked by a decline in school-related behaviors, motivation, interest levels, and self-perception of students (Eccles et al., 1991; Eccles et al., 1984; Farrington et al., 2012). For some, the outcomes may also be associated with a decrease in academic performance, grades, school attendance, engagement, connectedness, and possible dropout (Bill & Melinda Gates Foundation, 2011; Crockett et al., 1989; Eccles et al., 1991; Farrington et al., 2012). There is also evidence to suggest that the more transitions that a student is required to make, the more disruptive this can be to their learning experience (Crockett et al., 1989; Eccles et al., 1984).

Evidently these changes represent situations that can be very challenging for a young person, however, they also highlight an opportunity where schools can provide intervention that goes beyond the regular curriculum and course content (Crockett et al., 1989).

In considering these developmental and environmental outcomes that emerge throughout the middle schools years, which have been highlighted across decades of research, it is imperative that preventative measures be put in place to support the development of behaviors and mindsets that will lead to success at school (Farrington et al., 2012). In order to facilitate and support the development of non-cognitive factors amongst students, this also requires building and re-shaping the school environment to equip young people with the tools they require to manage these transitional periods, remain engaged, and advocate for their own learning needs (Eccles et al., 1991; Farrington et al., 2012). It is also important for schools to provide a safe and supportive environment that meets the presenting needs of students, and helps to make these transitions a positive experience (Eccles et al., 1991; Felner, Ginter, & Primavera, 1982).

Adolescence is also a period of development that is marked by an increased desire for autonomy and control, self awareness, exploring self-identity, a shift to more abstract thought, increased ability to self-regulate, a strong focus on peer relationships, and a need to develop meaningful relationships with adults within the school context (Eccles et al., 1991).

However, the research indicates that schools continue to provide an environment that does not leverage upon and foster these new capacities amongst young people (Farrington et al., 2012). Schools not only need to support students to manage transitional periods more effectively, but also promote the development of noncognitive skills and attributes that will help them to successfully meet new academic demands across both middle and high school (Farrington et al., 2012).

Furthermore, adolescence is also identified as a period when there is significant cognitive and emotional development occurring enabling a young person to begin thinking and processing information differently (Eccles et al., 1984; Farrington et al., 2012). The prefrontal cortex and other regions of the brain

begin to mature, resulting in the ability to increasingly engage in more abstract and higher order thinking (Farrington et al., 2012).

This reflects an optimal period to begin presenting students with new challenges, support them in taking ownership of their own learning, help them shape their own behavior, and make decisions about their engagement within the school environment (Farrington et al., 2012). Given that students are developmentally ready to make these significant shifts with their learning throughout the middle school years and beyond, teaching practices and classroom interventions must be re-structured to meet these needs (Farrington et al., 2012).

### **Academic Perseverance**

Academic perseverance is a concept that relates to student effort and the quality of academic behaviors that are demonstrated in response to this effort (Farrington et al., 2012). Research is suggesting that students who perform at a high level at school not only do what is required to achieve good grades, but they do these things well (Farrington et al., 2012).

Whilst academic perseverance requires an initial surge of momentum, focus, and direction, it also requires the ability to maintain this momentum despite obstacles or challenges that may get in the way (Farrington et al., 2012). Students with academic perseverance continue working hard, strive for a good grade despite the content being challenging or possible failure in the past, look for new ways to understand material that is difficult, don't give up, and work towards longer-term academic goals (Farrington et al., 2012).

Tenacity has been identified as an important factor underlying a student's academic performance, and is defined as being the mindsets and skills that enable a student to look beyond more immediate short-term goals to more long-term goals (Dweck, Walton, & Cohen, 2014; Farrington et al., 2012). It also involves the ability to withstand challenges and setbacks to continue persevering and working towards achieving these goals (Dweck et al., 2014; Farrington et al., 2012).

This can be directly influenced by students' academic mindsets, learning strategies, academic skills, and personality factors (Farrington et al., 2012). Tenacious students hold the belief that they can achieve success, employ effective self-regulatory strategies, and have strong social networks (Bill & Melinda Gates Foundation, 2011; Dweck et al., 2014).

In aiming to enhance academic tenacity, interventions that are most effective focus on changing the mindset of the student and establishing a learning environment that supports the development of a positive mindset, as discussed in the following section of this report (Dweck et al., 2014; Farrington et al., 2012). These mindsets and skills can be taught within a supportive school environment (Dweck et al., 2014).

Another component to maintaining perseverance and effort with academic tasks is grit (Farrington et al., 2012). This is reflected in a student's ability to remain focused on a long-term goal, despite obstacles and adversity, and eventually succeed in that goal (Duckworth, 2009; Farrington et al., 2012).

What has been identified is that achievement and success are no longer considered to be solely byproducts of intellect and talent, but of tenacity, perseverance, hard work, determination, practice, self-discipline, and sustained passion (Duckworth, 2009; Duckworth, Peterson, Matthews, & Kelly, 2007; Tough, 2011). Research has identified that grit is a quality that is essential for high achievement in any domain, and the element that helps people reach the top of their chosen field (Duckworth, 2009; Duckworth et al., 2007).

It is estimated that it takes at least ten years of sustained practice for a person to become a true expert in any given field, and grit is what enables them to sustain the effort that is required to achieve this (Duckworth, 2009; Farrington et al., 2012). These individuals will work hard on one significant goal with over an extensive period of time, and do not deviate from this pathway (Duckworth et al., 2007; Farrington et al., 2012).

Research has also established that grit is a quality that can be taught and developed in young people (Duckworth, 2009).

Within the middle school context, Duckworth, Grant, Loew, Oettingen and Gollwitzer (2011) designed an intervention that aimed to assist adolescents successfully strive for long-term learning goals. This was inclusive of an intervention that included mental contrasting, forming implementation intentions, and sustained self-regulation.

Mental contrasting is a process that facilitates goal setting by strengthening one's commitment to the goal. It involves framing a desired future and the contrasting this with present reality, which motivates the person to take action and strengthen their commitment to the goal. Subsequently, implementation intentions facilitate goal striving through effective planning and remaining on track so that the goal can be realized. When combined, these two processes (MCII) increase effectiveness of goal attainment.

This randomized study investigated the effectiveness of these processes for students preparing for the Preliminary SAT (PSAT) exam. Students in the MCII intervention received a PSAT workbook and were asked to write about the positive outcomes of finishing the practice tests, two obstacles that could prevent them from doing so, and two plans to overcome each of the two obstacles they had identified. When compared with students in the control group who received the same workbook but did not complete the MCII exercise, students in the intervention group completed substantially more of the workbook during their summer vacation.

## **Academic Mindsets**

Academic mindsets are the beliefs, attitudes, and perceptions that a student has in relation to their learning and intellectual tasks, which have a subsequent influence on academic performance (Farrington et al., 2012). A student's belief in their ability to learn and achieve success at school, also known as self-efficacy, has been found to be a very strong predictor of academic performance (Dweck et al., 2014).

Research is emerging to suggest that interventions designed to change and re-shape the mindsets of students are effective and have lasting, positive effects on learning and social outcomes (Farrington et al., 2012; Yeager & Dweck, 2012). A student's belief system has also been found to have implications for their persistence and level of resiliency when faced with challenges in the school environment (Dweck et al., 2014; Farrington et al., 2012).

There is evidence to suggest that there are four key mindsets that contribute to successful learning outcomes including, a sense of belonging at school, a belief that ability and competence can grow with effort, that one can succeed, and that the work is of value (Dweck et al., 2014; Farrington et al., 2012).

Experiencing a sense of belonging within the school and classroom environment has been found to have significant benefits for students, and also increases the likelihood that they will engage in academic behaviors that are beneficial (Farrington et al., 2012). Sense of belonging has also been associated with positive mindsets and increased levels of satisfaction at school (National Research Council, 2004).

Schools can also foster a sense of belonging in various ways including, personalizing learning and instruction, demonstrating a genuine interest in students' lives, facilitating connections between students and their teachers, explicitly identifying the values and goals of the school, and creating an environment that is both caring and supportive (National Research Council, 2004). Sense of belonging can also be achieved through ensuring the students feel included and respected by others in school setting (Dweck et al., 2014).

One example of a very brief in-class intervention that has been implemented within the middle school setting focuses on value affirmations of students (Cohen, Garcia, Apfel, & Master, 2006; Dweck et al., 2014). The purpose in developing this intervention was to remind students within the school setting of the things that they value the most in themselves. What was found was that through enabling students to think about and elaborate upon these qualities they value within the school setting, and bringing presence to these values led to an enhancement in their sense of belonging (Cohen et al., 2006; Dweck et al., 2014).

Research also indicates that students who hold the belief that they can use their own efforts to increase their level of competence and academic ability are more

self-motivated, persistent, and demonstrate learning behaviors that enhance academic performance (Farrington et al., 2012; Yeager & Dweck, 2012).

In comparison, students who believe that their capabilities are fixed and cannot be changed through their own efforts are more likely to focus outwardly on the opinions of others with regard to their level of ability, be less self-motivated and persistent, and perform less well at school (Dweck, 2006; Farrington et al., 2012).

Carol Dweck and colleagues refer to each of these viewpoints as the growth- and fixed-mindsets (Dweck, 2006). This approach asserts that the view an individual adopts for themselves has profound effects for the way they live their life, determines whether they become the person they want to be, and accomplish the things that they value (Dweck, 2006).

Students with a growth-mindset view failure as an opportunity to learn, believe that personal qualities and intellectual skills can be fostered and developed through effort, and that everyone can change and grow over time as a result of their experiences (Dweck, 2006). This mindset is also reflected in an ability to take risks, confront challenges, to keep working at them, and thrive as a result (Dweck, 2006). These students are resilient in the face of setbacks, see learning as a priority, and continually stretch themselves to learn something new (Dweck, 2006).

For learners with a fixed-mindset, the experience of learning is viewed quite differently. Qualities, abilities, and intellect are seen as things that are carved in stone and there is an ongoing need to prove oneself (Dweck, 2006). There is also a strong emphasis on being flawless and free from mistakes, and experiencing a deep-seated sense of failure when these qualities are not upheld (Dweck, 2006). Students with a fixed-mindset thrive in situations that are safely within their grasp, experiencing fear in the face of challenges, losing interest, and devaluing situations where effort is required (Dweck, 2006).

Research indicates that adolescence is a period where students often evaluate themselves from a fixed mindset, and this is also reinforced within the school and social contexts (Dweck, 2006).

Research also indicates that growth mindset and a passion for learning can be taught, and the simple act of knowing about the two mindsets can already begin to instill change amongst young people (Dweck, 2006). Whilst this process may take time, new beliefs can sit alongside old ones and as they become stronger provide a different way of thinking, feeling, and acting (Dweck, 2006).

Within the classroom context, teachers can promote and adhere to the idea of a growth-mindset and create a culture where all students can become fascinated by possibilities and the process of learning (Dweck, 2006). It has also been found that care must be taken to ensure that praise and feedback are directed towards a student's effort and commitment to doing what it takes to succeed (Dweck, 2006; Mueller & Dweck, 1998). Setting high expectations for all students is also

integral to the learning environment, as well as providing the necessary supports to help students reach these expectations (Dweck, 2006).

A number of interventions have been developed and found to successfully facilitate the development of a growth mindset when working with students. Some examples of how this has been achieved within educational setting are through delivering workshops, displaying messages about the growth mindset, and emailing prompts to students (Dweck et al., 2014).

A more structured and comprehensive approach is the Brainology program that has been designed to help students develop a growth mindset through the combined use of online instruction, and follow-up classroom activities (Dweck, 2006; Mindset Works, 2015). The aim of the program is to demonstrate to students that they are in control of their brain and its development; that the brain is a muscle capable of growth and change which becomes stronger the more that we use it and learn new things; the more you challenge your mind the more your brain cells grow; things that were once very hard or impossible seem to become easy with effort; and that the brain needs care and nourishment to perform at an optimal level including, adequate sleep, eating the right things, and using good study strategies (Dweck, 2006; Mindset Works, 2015).

In addition to this program, a further example of a classroom activity that has been used effectively includes having students work through a series of dilemmas (Dweck, 2006). Students are required to consider their reactions from a fixed-mindset and how they may solve the dilemma from a growth-mindset (Dweck, 2006). This includes making concrete, growth-oriented plans for something you want to learn or confront from the dilemma, and visualizing a way to carry this out (Dweck, 2006).

Overall, research indicates that interventions that educate students about the growth mindset lead to a difference in behavior, motivation to learn, commitment to improvement, resilience, and achievement (Dweck, 2006; Mindset Works, 2015; Yeager & Dweck, 2012).

Another important component of a student's academic mindset is the belief that the work they are doing and the learning that is taking place holds relevance in their lives, and is of value to them (Farrington et al., 2012). Through achieving this, a student can become inherently motivated, persistent, and interested in their learning as they imagine their future goals (Farrington et al., 2012; Oyserman, Terry, & Bybee, 2002).

In a study conducted by Oyserman et al. (2002), the researchers developed a Schools-to-Jobs intervention that was designed for marginalized middle school students to assist them in imagining themselves as successful adults, and connecting these future aspirations to their current attendance at school. This program was implemented after school over a 9-week period and involved students participating in various small group activities.

Sessions were developed around the themes of students:

- imagining the stage of adulthood through looking at images of adults engaging in various life domains and talking about these images;
- creating a personal timeline that extends from the present to as far into the future as the student can go, with facilitators normalizing failures and setbacks;
- building a connection between their current schooling, the year ahead, and their future possible selves by mapping out possible strategies to achieve future goals;
- small group problem solving of everyday problems encountered at school;
- planning for high school graduation and college entry; communication skills; and
- preparedness for future jobs prospects, career pathways, qualifications, and attending informational interviews.

At the conclusion of the school year, this intervention was shown to have positive effects for student engagement, learning behaviors, identified strategies to achieve future aspirations, school attendance, and bonding to school.

### **Social Skills**

Social skills are reflected in qualities such as, cooperation, assertiveness, responsibility, empathy, self-control, awareness of self and others, effective decision-making, and maintaining relationships with others (Farrington et al., 2012).

Research suggests that there is a link between social skills and academic performance, in particular it has been shown that a range of school interventions designed to build social-emotional competencies of students have been associated with positive effects on achievement levels (Farrington et al., 2012). Factors that are more likely to lead to change and positive outcomes for students include, having well-trained facilitators, focusing on behavioral skill-building approaches, and implementing programs at a school-wide level (Farrington et al., 2012). Additional ways that social-emotional development can be fostered and promoted within the school and classroom environments include providing safety, care, inclusivity, structure, and a sense of community (Farrington et al., 2012).

Also aligning with development of social-emotional skills is the field of positive education, an approach to learning that advocates for building traditional skills, optimism, and happiness amongst young people, as described by Seligman, Ernst, Gillham, Reivich and Linkins, 2009.

Positive education is based on the premise that the school environment is a place where the skills of wellbeing and academic achievement can be taught conjointly. Extensive research also provides further support to indicate that the skills that lead to an increase in resilience, positive emotion, and meaning can all be taught to students. Whilst instilling these skills and qualities in young people

may have positive outcomes for wellbeing, it also provides a foundation for better learning. Additionally, positive emotion has also been linked with increased attention, creative thinking, and more holistic thinking.

The field of Positive Psychology outlines three components to the experience of happiness (Seligman et al., 2009). The first being the experience of positive emotions, the second is finding a state of flow and being engaged with the life experience, and the third being a meaningful and purposeful life (Seligman et al., 2009).

It is the experience of achieving a sense of meaning that is enhanced by our connections with others (Seligman et al., 2009). Optimism, however, is a trait that is evident in a person who feels positively about the future, never gives up in the face of stress and adversity, thinks about negative events in a constructive way, pursues the goals that are of most importance to them, and works towards the goals that they feel confident in achieving (Forgeard & Seligman, 2012).

Teachers are viewed as being largely influential in promoting optimism through setting an example and giving thought to the language that they use when addressing student success, mastery, and failure (Seligman, 1995). It has also important for students to be taught the skills of flexible and reality-based optimism (Seligman, 1995).

There are two examples of interventions that have been developed to promote and enhance happiness, optimism, and wellbeing in adolescents, including the Penn Resiliency Program (PRP) and Positive Psychology Programme (Forgeard & Seligman, 2012; Seligman et al., 2009). These programs also incorporate elements of social skills, problem solving, and interacting with others. The PRP is a 12 session curriculum, and teaches students the skills needed to handle everyday stressors and problems that are commonly encountered during the stage of adolescence (Forgeard & Seligman, 2012; Seligman et al., 2009). It promotes optimism through teaching students to think more flexibly and realistically about problems that they may encounter (Forgeard & Seligman, 2012; Seligman et al., 2009).

The program also places an emphasis on teaching assertiveness, brainstorming, decision-making, problem-solving strategies, coping skills, and relaxation (Seligman et al., 2009). Evaluative studies have found that PRP elicits positive outcomes for student wellbeing (Seligman et al., 2009).

The Positive Psychology Programme is also a curriculum-based intervention that has been developed for adolescents (Seligman et al., 2009). The program is implemented over a year-long period and aims to help students identify their signature character strengths, and increase the use of these strengths within their daily life (Seligman et al., 2009). Strengths may include qualities such as, perseverance, kindness, courage, and wisdom (Seligman et al., 2009).

The intervention also aims to promote a student's resilience, positive emotion, meaningfulness, and sense of purpose (Seligman et al., 2009). Lessons involve discussions about character strengths, class activities, homework activities, and a reflective journal (Seligman et al., 2009). The program has been found to increase enjoyment of school, engagement at school, social skills, and achievement (Seligman et al., 2009).

### **Learning Styles and Theoretical Approaches**

Whilst not specifically categorized a non-cognitive factor, another important aspect that has been linked with student engagement, motivation, self-awareness, and lifelong learning is an increased understanding and accommodation of variant learning styles within the classroom context (Coffield, Moseley, Hall, & Eccleston, 2004; Tomlinson et al., 2003).

This can be achieved through identifying the different learning styles of students, engaging in dialogue with students about these variations, encouraging them to reflect on their own learning style, and aligning this knowledge with teaching practices and classroom interventions (Coffield et al., 2004; Tomlinson et al., 2003). Through applying these practices, students can also become more aware of their own strengths and weaknesses, and teachers can respond to these differing needs accordingly (Coffield et al., 2004).

Whilst this is an area still requiring further research, learning styles can help to identify the different ways that students prefer to take in information (Coffield et al., 2004; Prashnig, 2005). Developing a deeper understanding of learning styles has also been identified as a useful tool for facilitating students in 'learning to learn', identify ways to enhance their learning, and become more independent in the learning process (Coffield et al., 2004; Tomlinson et al., 2003). It has also helped students to gain more confidence and control over their own learning (Coffield et al., 2004). The qualities and interests that are unique to the learner can be identified and nurtured (Coffield et al., 2004; Institute for Learning Styles Research, 2015; Tomlinson et al., 2003).

The Institute for Learning Styles Research (2015) is an organization that conducted extensive research and developed a perceptual learning styles theory. This theory outlines seven perceptual styles that assist students to extract information from the surrounding environment, relying on the use of their five senses. Each learner is thought to have their own unique pathway for extracting information. This theory is inclusive of seven perceptual modes, or pathways including: (1) print, which includes seeing printed or written words (2) aural, which involves listening (3) interactive, where there is a preference for verbalization, (4) visual, refers to seeing visual depictions (5) haptic, which includes grasp and touch (6) kinesthetic, including whole body movement, and (7) olfactory, which refers to the sense of smell and taste.

As an extension of this theory, two measurement tools have also been developed, The Perceptual Modality Preference Survey (PMPS) and the Multi-Modal Paired Associates Learning Test (MMPALT). These tools have been shown

to be helpful for students in identifying their own perceptual strengths and preferences as a learner.

Multiple intelligences (MI) is a theoretical framework for understanding and developing people's different intelligence factors, their range of capacities and potentials (Gardner, 1999; Prashnig, 2005). Whilst this theory does not fall under the category of learning styles, it can also be used to convey an important message to teachers and students about capabilities.

Consistent with the literature relating to non-cognitive factors and the growth mindset, this theory also deviates from the traditional notion that a person's cognitive ability can be adequately measured by a singular score obtained on a standardized test (Gardner, 1999; Stanford, 2003; Strauss, 2013). Developed by Howard Gardner, MI categorizes intelligence into seven distinct human capacities including: (1) linguistic, the ability to learn and use language to accomplish goals, (2) logical-mathematical, which involves analyzing problems, mathematical tasks, and scientific inquiry, (3) musical, having skill in composing, performing, and an appreciation for musical patterns, (4) bodily-kinesthetic, using the whole body or parts of the body to solve problems or develop products, (5) spatial, an ability to recognize and manipulate patterns, (6) interpersonal, the ability to understand and work effectively with others, and (7) intrapersonal, reflecting a capacity to understand oneself (Gardner, 1999; Stanford, 2003; Strauss, 2013).

At a later stage, naturalistic intelligence was also added and reflects an ability to recognize and classify numerous species from the environment (Gardner, 1999; Stanford, 2003). It is believed that there may also be more (Strauss, 2013).

Within the school context, MI has been explored and applied effectively through the creation 'pods' and 'learning centers' in accordance with the particular intelligences for students to pursue an area of interest in more depth, to have students complete a project on someone that exemplifies a particular intelligence, developing classroom activities for students to explore their own strengths and weaknesses in each of the areas, and integrating lesson plans and curriculum that reflect MI (Gardner, 1999; Stanford, 2003).

All Kinds of Minds has also developed a neurodevelopmental framework to help educators describe and understand all kinds of learners, as outlined by the research and literature of All Kinds of Minds (2015) and Barringer, Pohlman, and Robinson (2010). The framework reflects a synthesis of research from a range of fields including neuroscience, cognitive psychology, and developmental psychology to outline components of brain functioning and how these affect student learning.

There are eight constructs that are believed to form the foundation for identifying and addressing a student's strengths and weaknesses as a learner, and can be used to promote academic success. Whilst distinct, these constructs are also thought to overlap in practice. Attention forms one of the constructs,

and reflects an ability to maintain mental energy for learning and work, to absorb and filter information, and discern the quality of academic outputs.

Higher order cognition, or complex thinking, includes conceptual understanding, generating novel ideas, and approaching complex problems in a logical way.

- The area of language is reflected through understanding written and oral information, and being able to communicate both of these mediums. Memory, which includes drawing upon short-term memory, manipulating and using information while completing a task, and storing and recalling information at a later time point.
- Neuro-motor functions, or controlling movement, includes coordinated bodily movement, gross and fine motor skills, in particular muscle coordination required for handwriting.
- Social cognition, or making and keeping friends, involves knowing about social conventions and styles of interaction, cooperating with others, and nurturing positive relationships with significant others.
- Spatial ordering, or visual thinking, involves both understanding and generating visual information, as well as organizing materials and spaces.
- Temporal-sequential ordering, or keeping track of time/order, is reflected in an ability to sequence information, arrange products in a meaningful order, and organize one's time and schedules.

From the perspective of intervention, All Kinds of Minds (2007) has developed a process 'Attuning a Student' which is a comprehensive approach that draws together the teacher, student, and family to determine the strengths and challenges of the learner. The goal is to view this process from a point of optimism and collaboration.

A key feature of this approach is that the student themselves is invited to become 'attuned' to their own needs and is viewed as being their own advocate in the support process. Information is gathered from a range of sources, observations, work samples, and use of an attunement measurement tool. This information is then used to develop a profile of the students learning profile, in accordance with the neurodevelopmental framework, and a management plan is put in place outlining support strategies. The plan is monitored and progress reviewed, with the student playing a central role in all of these processes.

## **Student Autonomy in the Classroom**

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### **Environmental Factors and Teaching Practices**

A study by Stefanou, Perencevich, DiCintio, and Turner (2004) explored the varying factors within the classroom and school environment that can help students build autonomy and ownership of their own learning. As discussed throughout this paper, it is well established that teacher instruction and the

classroom environment are very influential in a student's perceptions, motivation, beliefs, and behaviors.

The authors assert that there are three needs of the student that must be met to promote optimal learning including, competence, relatedness, and autonomy. These factors can either be facilitated or diminished within the learning environment.

In working towards enhancing student autonomy within the middle school context, this involves teachers and other adult figures providing information about the process of learning, and opportunities for students to make choices about their own learning. It also requires a democratic leadership style and reduction in the use of controlling strategies within the classroom.

Effective enhancement of student autonomy has been associated with persistence on tasks, on-task behavior, self-regulated learning, curiosity, positive attitudes towards learning, and perceived competence. Many of these outcomes and behaviors are thought to accumulate over time, and also align with non-cognitive factors.

Through investigating student autonomy, research has been established that teachers who work towards enhancing this attribute report that they adhere to a student-centered approach, nurture competence in their students, communicate with students in a non-controlling way, and aim to internalize these practices within their students.

In a practical sense, this is reflected through the following:

- listening to students more; allowing students to handle and manipulate instructional materials and ideas more often;
- asking about student wants;
- responding to student-generated questions;
- perspective-taking and understanding of the students emotional state;
- refraining from giving solutions or using directives;
- fostering relevance of learning activities;
- allowing students to express dissatisfaction with learning activities and acting upon this;
- providing opportunities for students to choose tasks consistent with their person goals and interests; and
- enabling students to express their desires and become co-decision makers in the learning process.

Overall, this requires opportunities for students to express autonomy within the classroom environment at an organizational, procedural, and cognitive level.

## Summary

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- Emergent research highlighting the significance of non-cognitive factors in the learning process
- Moving away from an emphasis on cognitive skills and intelligence to find other factors associated with enhancing learning and academic performance
- Farrington et al. (2012) outline five categories of non-cognitive factors within the school context: academic behaviors, academic perseverance, academic mindsets, learning strategies, and social skills
- Whilst the focus of this study is on middle school years, providing intervention at this developmental stage may also have future implications (i.e. college and work readiness). Not just an immediate focus, but also considering potential long-term impacts and outcomes for students
- A focus on the middle school years is important due to a number of factors: transitions, brain maturation, changing thought processes, changing needs as students seek more autonomy, identified need for schools to re-shape the learning context to meet these needs
- The areas to be targeted in the intervention can all be taught and re-shaped within the school environment, students can learn about and develop these skills
- Successful development of non-cognitive factors will require change at the individual, teacher, and school-wide level. However, there is a strong emphasis in literature on the importance of changing the school and classroom environment to meet the needs of students.
- There is an evident gap in the literature relating to intervention in schools and (a) non-cognitive factors, (b) student autonomy and advocacy, (c) the combination of factors proposed in this current study
- Academic perseverance is reflected through the qualities of tenacity and grit, and can promote academic achievement
- Four key mindsets that contribute to successful learning outcomes including, a sense of belonging at school, a belief that ability and competence can grow with effort, that one can succeed, and that the work is of value
- Approaches to learning styles and theoretical models (i.e. ILSR, MI, All Kinds of Minds) can be applied in the classroom context through general strategies to engage and motivate students, as well as increase their self awareness about their own capacities and preferences as a learner
- Positive psychology programs can be used to enhance happiness, optimism, wellbeing, learning, and achievement amongst adolescents. Intervention programs also incorporate elements of social skills, problem solving, and interacting with others
- Important factors for students within the classroom and school environment that are required for optimal learning include, competence, relatedness, and *autonomy*. Student autonomy has been found to promote persistence on tasks and increase self-regulation. Achieved

through teaching practices, and enabling student ownership of the classroom environment, delivery of content, and cognitive autonomy.

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## **The Centre for Inspiring Minds**

ACS International Schools  
West Lodge  
Portsmouth Road  
Cobham, Surrey  
KT11 1BL

On-line at <https://cim.acs-schools.com>  
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