Growth Mindset Thinking and Beliefs in Teaching and Learning

August 2020

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CONTENTS

RESEARCH BRIEF

Anyone who has never made a mistake has never tried anything new.
– Albert Einstein

INTORDUCTION

This policy paper presents findings from a wide range of literature on growth mindset in primary and secondary education. Part 1 describes key insights from research on growth mindset. Part 2 presents promising practices to improving students' growth mindset beliefs and thinking. Part 3 provides recommendations for IB stakeholders, meant to strengthen and reinforce the IB programme's potential to facilitate student growth mindset thinking across contexts.

WHAT IS GROWTH MINDSET?

Every person carries a mindset, or implicit view, about the nature and origin of their own ability, and the ability of others. Mindset beliefs and thinking exist on a continuum, ranging from *fixed* mindset at one end to *growth* mindset at the other end. Students holding a *fixed* mindset, or *entity beliefs*, about their ability and the ability of others believe that intelligence and abilities are innate and unalterable. **Students with a *growth* mindset, or *incremental theories,* believe that intelligence and abilities are malleable and can be developed with effort.** However, **students rarely hold one mindset, exclusively, in *all* circumstances.** They typically exhibit a moderate mindset, where they may hold beliefs that fit into some aspects of a fixed mindset and some aspects of growth mindset, depending on the context and skill area (Dweck, 2006).

WHY DOES GROWTH MINDSET MATTER IN EDUCATION?

Students' interpret their environment through the lens of their beliefs and perceptions. Students' beliefs are shaped by their experiences and by cues they receive through their interactions with others around them—parents, teachers, coaches, mentors, and peers. **Students' beliefs about intelligence can lead them to interpret day-to-day classroom experiences as either threatening and indicative of a deficit in ability (fixed mindset) or exciting and indicative of a potential for development (growth mindset).**

WHAT DOES THE RESEARCH SAY ABOUT MINDSET THEORY?

Mindset theory suggests that implicit beliefs about intelligence play a critical role in academic achievement; however, the link between growth mindset and academic achievement has been mixed. **The mixed findings illustrate how the beliefs we carry, even those that may be unsupported by facts, are powerful, sensitive to context, triggered by circumstances and others, and often stubborn and difficult to change.** Notable findings about growth mindset include:

- **Mindset and Academic Achievement:** Growth mindset beliefs have been found to predict higher academic achievement in a number of studies; however, meta-analytic research has found a weak relationship between growth mindset and academic achievement. This weak relationship may be due to few interventions meeting accepted the standards for rigor required to show an impact on achievement.
- **Benefits of Growth Mindsets:** Some evidence suggests growth mindset can have a positive effect on students beyond academic achievement, including more positive attitudes towards school, higher academic confidence and psychological well-being, increased motivation and school engagement, and higher academic resilience and persistence.
- **Mindset Across Student Groups:** The relationship between growth mindset and achievement has been examined and supported for key student groups, including students with disabilities, gifted students, and students from marginalized socioeconomic backgrounds. Results suggest academically at-risk students and economically disadvantaged students may benefit most from growth mindset interventions.
- **Mindset Across Developmental Periods:** Mindset theory has not linked the onset of implicit beliefs to a specific developmental period, some research suggests that mindsets are particularly influential during challenging academic transitions, such as from primary into middle grades and throughout adolescence.
- **Mindset Across Global Contexts:** Studies have demonstrated a positive relationship between mindset and academic achievement in a number of countries, including Australia, China, Chile, England, Norway, Turkey, South Africa, and the U.S. Further, recent PISA results support the idea that students' growth mindset resulted in better academic performance, with only 4 out of 70 participating education systems showing no relationship or a negative relationship between growth mindset and academic performance.

HOW DO GROWTH MINDSET, METACOGNITION, AND ACADEMIC RESILIENCE WORK TOGETHER?

Given the recent increase in attention around social and emotional learning in education, the IB commissioned three policy papers focused on key interrelated social and emotional learning topics that are most closely aligned to the work of IB: metacognition, growth mindset, and academic resilience. Research illustrates how these three factors work together in teaching and learning. Failure, setbacks, and mistakes are a natural and inevitable aspect of school and academic learning. Adaptive responses to the stress of setbacks draw on growth mindset thinking about ability, the metacognitive knowledge and skills to make adjustments and be strategic, and the academic resilience to persevere with confidence, composure, and control. Metacognition skills may be critical for learners to implement a growth mindset when stressed and to manage emotions when failure makes them want to quit. When teachers message and model a growth mindset in the face of setbacks in their own learning, they illustrate a self-regulatory process that underpins the academic resilience students need in their own lives. Recognizing one's fixed mindset dialogue and adjusting to make room for growth mindset thinking is a metacognitive process that sets the stage for academic resilience. Goal-setting and consistent reflection on progress toward those goals are also important metacognitive processes that influence growth mindset and, in turn, academic resilience. Goals emphasize the link between effort, strategy, and progress in learning. Reciprocally, mindset beliefs and thinking will influence how teachers and students use metacognitive knowledge and skills. It is important to understand how these three factors of growth mindset, metacognition, and academic resilience interact in typical academic experiences across grade levels and content areas. They do not function in isolation.

WHAT POLICIES, PRACTICES, AND PROGRAMS SUPPORT GROWTH MINDSET?

Approaches to facilitating growth mindset thinking and beliefs vary widely from large-scale government policies and international education programs to discrete classroom practices. This brief covers policies, practices, and programs developed in K–12 education around the world to support growth mindset development in students and the educational stakeholders that support them. Although the direct effects of policy on the growth mindset of teachers and students has not been studied, examples of philanthropic organizations, research centers, education agencies, and specific schools are described to illustrate implementation of initiatives to support growth mindset development in students. The importance of establishing grading and testing policies that support growth mindset is also covered. Additionally, specific promising practices are explored for school leaders, teachers, families, and students. These examples provide concrete actions that can be taken to facilitate growth mindset in students. Finally, four effective programs are described to highlight characteristics of effective growth mindset interventions:

- **Brainology:** Mindset Works Brainology and SchoolKit support growth mindset development of school staff and students.
- **Changing Mindsets:** The Changing Mindsets program in the UK focuses on both teachers and students and demonstrated modest gains in student academic performance.
- **World Bank's Growth Mindset Program:** Online growth mindset training for South African students improved attitudes toward learning and academic performance.
- **Denmark's Reading Intervention:** A parent growth mindset intervention in Denmark improved student reading abilities, particularly among students whose parents had held fixed mindsets.

Given that growth mindset has largely developed through research with Western cultures, the policies, practices, and programs reviewed here are heavily influenced by Western culture and may not be received in the same way when implemented with other cultures. As such, it is important to consider cultural norms and expectations and inquire within your own school whether adaptations are needed to the presented policies, practices, and programs to be successful in your particular context.

WHAT DO WE RECOMMEND FOR IB STAKEHOLDERS?

This section presents recommendations for IB, educators (school leader and teachers), and parents and students interested in integrating growth mindset thinking and beliefs in their personal and professional lives. It is important to recognize that growth mindset, as a concept, can be somewhat controversial. However, the recommendations provided here, while directed at improving growth mindset, also may improve similar skills (e.g., self-efficacy, attribution, goal orientation, locus of control) and are generally considered best practices in education.

RECOMMENDATIONS FOR THE IB ORGANISATION

The IB has a number of supports in place for facilitating growth mindset in school leaders, teachers, and students. These recommendations are intended to strengthen and reinforce growth mindset beliefs and thinking into programme curricula by making it explicit. However, whether IB wants to specifically frame these recommendations as directed at improving growth mindset or incorporate the recommendations more broadly, as promising practices for social and emotional learning, is less important than whether they are implemented.

- **Recommendation 1:** Consider explicitly incorporating growth mindset beliefs and thinking in IB's Approaches to Learning

- **Recommendation 2:** Consider directly embedding growth mindset modeling and messaging into IB programme resources
- **Recommendation 3:** Provide guidance for schools to develop a school culture that supports growth mindset beliefs and thinking
- **Recommendation 4:** Provide a compendium of growth mindset professional learning opportunities and resources for school leaders and teachers
- **Recommendation 5:** Consider providing resources for parents

RECOMMENDATIONS FOR IB SCHOOL LEADERS AND TEACHERS

School leaders and teachers are at the heart of facilitating growth mindset thinking in their students. In many instances, school leaders and teachers may already be engaged in activities that support growth mindset thinking. These recommendations are intended to refine and strengthen existing processes and practices, as well as introduce some new processes and practices that school leaders and teachers may consider to more explicitly address growth mindset beliefs and thinking.

- **Recommendation 6:** Consider cultural norms and expectations prior to implementing a growth mindset initiative
- **Recommendation 7:** Consider a systems approach for growth mindset initiatives
- **Recommendation 8:** Build a school culture and classroom environment that supports growth mindset thinking
- **Recommendation 9:** Model growth mindset behavior and language
- **Recommendation 10:** Consider explicitly teaching students about the brain

RECOMMENDATIONS FOR IB PARENTS

Parents establish the foundations for student mindsets. Thus, it is important for parents to foster growth mindset beliefs and thinking in their children from a young age. Parents should consider whether these approaches align with their specific parenting styles and whether these strategies would work with their individual child's personality.

- **Recommendation 11:** Model growth mindset behavior and language

RECOMMENDATIONS FOR IB STUDENTS

Although students receive messages about their abilities from others, students are ultimately responsible for which messages they accept and for changing their thought processes.

- **Recommendation 12:** Identify fixed mindset triggers and respond with growth mindset thinking and actions

CONCLUSION

Even with mixed research findings, growth mindset has been widely accepted by educators, incorporated in educational policies, and implemented emphatically in classrooms across the world with students of all ages. Although future research is needed on the effects of systematic growth mindset interventions, there appears to be some evidence that, when implemented correctly, growth mindset interventions can have meaningful effects on teachers, parents, and students. However, these effects may not have a lasting impact. Given the complex nature of growth mindset and the competing sources of information that shape students' mindset beliefs, it is unrealistic to expect a single growth mindset intervention to result in enormous shifts in student beliefs about their intelligence or their academic achievement, especially if nothing else changes in the school and classroom environment. However, consistent and comprehensive efforts across the community of support for students could result in substantial, long-term benefits and sustained effects over time.

PART 1.
GROWTH MINDSET THINKING AND BELIEFS IN TEACHING AND LEARNING: A LITERATURE REVIEW

Success is the ability to go from one failure to another with no loss of enthusiasm.
– Sir Winston Churchill

1.1. INTRODUCTION

Across three decades, researchers have studied the implicit theories, or *mindsets*, we hold about our abilities and intelligence, probing the role those beliefs play in our motivation and achievement in school and beyond. This policy paper provides an overview of recent research on how mindsets take shape in K–12 students and influence student learning and outcomes of success, including a brief review of school- and system-level supports and considerations to measure and track students' mindset. We used a systematic literature review process to identify research and programs from around the world from 2000–2020 with the aim of understanding how mindset takes shape in student learning and what schools can do to support its development for students (see the Appendix for additional information about the methodology).

1.2. WHAT IS GROWTH MINDSET?

Every person carries a mindset, or implicit view, about the nature and origin of their own ability, and the ability of others. Mindset beliefs and thinking exist on a continuum, ranging from *fixed* mindset at one end to *growth* mindset at the other end. Students holding a *fixed* mindset, or *entity beliefs*, about their ability, and the ability of others, believe that intelligence and abilities are innate and unalterable. **Students with a *growth* mindset, or *incremental theories,* believe that intelligence and abilities are malleable and can be developed with effort.** They believe hard work, practice, good strategies, instruction, and input from others can pay off.

Growth mindset is the belief that intelligence and abilities are malleable and can be developed with effort.

A variety of modeling and messaging within a classroom setting can trigger, reinforce, or challenge students' beliefs about the nature of ability and intelligence. This process plays a role in motivation and engagement and the resulting outcomes of learning.

When students carry a fixed mindset, they believe that a person possesses a certain amount of intelligence and cannot affect the level of intelligence or ability they have through effort and practice. Fixed mindset thinking leads to concern with others' perceptions of one's intelligence and the avoidance of

challenges in order to preserve positive perceptions of one's ability (Dweck, 2006; Dweck & Leggett, 1988; Yeager et al., 2016). For instance, when students engage in fixed mindset beliefs and thinking, they focus on competing for the best grade and comparing themselves to other students rather than seeking out the satisfaction of mastery (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013). It is possible for students to believe that their intelligence is more fixed than the intelligence of others. Those students may believe that intelligence is malleable but just not for them. When this difference between *self* theories and *general* theories exists, motivation towards mastery is lower and helplessness, self-handicapping, and disengagement in school increases (De Castella & Byrne, 2015).

Students holding a growth mindset are more resilient to setbacks. **Growth mindset thinking sees failures and mistakes as opportunities to learn and grow** (Dweck & Leggett, 1988; Mangels, Butterfield, Lamb, Good, & Dweck, 2006). Students holding a growth mindset believe that innate gifts and talents are just the starting point—success is based on dedication and hard work. Growth mindset thinking does not necessarily project that everyone has the same potential, rather everyone can improve their current ability if they work hard (Dweck, 2006; 2008; Dweck & Leggett, 1988; Yeager, et al., 2016). **It is also important to understand that students rarely hold one mindset, exclusively, in *all* circumstances.** They typically exhibit a moderate mindset, where they may hold beliefs that fit into some aspects of a fixed mindset and some aspects of growth mindset, depending on the context and skill area (Dweck, 2006). Thus, it is possible for people to hold contradictory beliefs about their abilities at the same time.

Finding 1: Students rarely hold one mindset in *all* circumstances, and often exhibit a mindset somewhere between fixed and growth.

1.3. WHY DOES GROWTH MINDSET MATTER TO STAKEHOLDERS IN EDUCATION?

Students' interpret their environment through the lens of their beliefs and perceptions. Students' beliefs are shaped by their experiences and by cues they receive through their interactions with others around them—parents, teachers, coaches, mentors, and peers, for instance. In an educational context, students take cues from the messaging in the environment, grading policies, teacher feedback, peer-to-peer dialogue, and parental concerns and encouragement. That messaging determines what goals are important and what actions students should take to fulfill those goals (Dweck, 2006; Yeager & Walton, 2011). Mindsets integrate goals, beliefs, and behaviors to shape students' thoughts and actions (Dweck & Yeager, 2019). This integration plays out daily in classroom environments worldwide across every cultural context. **Students' beliefs about their intelligence can cause**

Finding 2: This integration of goals, beliefs, and behaviors plays out daily in classroom environments worldwide across every cultural context.

them to interpret the day-to-day experiences in the classroom as either threatening and indicative of a deficit in ability (fixed mindset) or exciting and indicative of a potential for development (growth mindset; Dweck, 1999).

1.4. WHAT DOES THE RESEARCH SAY ABOUT MINDSET THEORY?

More than 30 years ago, Carol Dweck and her colleagues began studying student responses to failure, focusing specifically on why some students rebounded easily while others did not. Mindset theory has evolved alongside recent advances in neuroscience. Research on brain plasticity has shown that the actions a person takes (e.g., using good strategies, asking questions, and practicing) can increase our neural growth by building new connections, strengthening existing connections, and building insulation around the axon that transmits information between neurons more quickly. Simultaneously, researchers began to research the link between mindsets and achievement, investigating how beliefs about the brain influence a person's actions. Thus, researchers examined whether it was possible to change a person's mindset (Mindset Works, 2017a).

Although the first seminal study on mindset was published in 1988 (Dweck & Leggett, 1988), research on growth mindset is still considered, by some, to be in its infancy (Dweck, 2018). Though mindset theory has received considerable attention in education throughout the last two decades, findings are mixed. For instance, questions continue to arise about how these beliefs change, the endurance of those changes, differences across domains and types of ability (e.g., creativity), capacity to hold contradictory fixed and growth beliefs at once, and the meaning of implicit theories about oneself and implicit theories about others. Thus, there is still much to learn about mindset and how to foster adaptive, growth-oriented mindsets in students (Dweck, 2018). It is also important recognize that growth mindset, as a skill or ability, can be somewhat controversial. The term has been used as a buzzword and educators often have negative perceptions due to their experiences with subpar implementation of growth mindset concepts and programs. Further, growth mindset is related to other, more widely accepted motivational concepts and skills, such as self-efficacy, attribution, goal orientation, and locus of control—much of this papers' content is relevant to these other skills. As such, even if the idea of growth mindset follows with a degree of skepticism, the paper and resulting recommendations will still be relevant. This paper highlights promising evidence related to growth mindset as well as the important questions raised by inconsistencies in the literature across different contexts.

HOW DOES GROWTH MINDSET DEVELOP AND AFFECT LEARNING?

Mindset theory suggests that implicit beliefs about intelligence play a critical role in academic achievement (Rattan, Savani, Chugh, & Dweck, 2015); however, the link between growth mindset and academic achievement

has been mixed. Holding a growth rather than fixed mindset has been found to predict higher academic achievement in a number of studies (Grant and Dweck 2003; Blackwell et al. 2007; Dweck 2008). In a longitudinal study, Blackwell and colleagues (2007) examined the academic performance of students across two years from the beginning of Grade 7 to the end of Grade 8. By the end of Grade 8, students with a growth mindset showed an upward trajectory in mathematics performance compared to their fixed mindset peers (Blackwell, Trzesniewski, & Dweck, 2007). In Chile, when mindset of all Grade 10 students was surveyed, students with a growth mindset were three times more likely to score in the top fifth of the national mathematics and language arts exam while those with a fixed mindset were four times more likely to score in the bottom fifth (Claro, Paunesku, & Dweck, 2016).

Finding 3: Mindset theory suggests that implicit beliefs about intelligence plays a critical role in academic achievement.

The relationship between growth mindset and achievement has been examined and supported for key student groups, including students with disabilities, gifted students, and students from marginalized socioeconomic backgrounds. Developing a growth mindset improved academic performance in students with disabilities (e.g., Carvalho & Skipper, 2019; Froedge, 2018), and growth mindset improved academic performance in students with attention deficit hyperactivity disorder (Roberts, 2007) and oppositional defiance disorder (Da Fonseca et al., 2010). Further, gifted and talented students have been more likely to endorse a growth mindset than the general student population. A growth mindset is particularly important for gifted students because they are at risk for both under-achievement and perfectionism, which may hinder them from reaching their potential (Esparza, Shumow, & Schmidt, 2014). Moreover, growth mindset appears to be especially beneficial for the academic success of students from marginalized socioeconomic backgrounds. Unfortunately, the circumstances and school experiences of children in families with less access to economic resources contributes to a greater likelihood for fixed mindset thinking (e.g., Claro et al., 2016; Yeager et al. 2016). Fostering a growth mindset has been seen as a foundational step to support socioeconomically marginalized students' growth.

In contrast to those positive effects, two meta-analyses found a weak relationship between growth mindset and academic achievement (Burnette et al., 2013; Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018). One meta-analysis of 129 studies representing more than 20 different countries found the relationship between mindset and academic achievement to be positive but weak. Examining the effectiveness of mindset interventions across 29 studies, those researchers found mindset interventions had little effect on student achievement, overall. **However, results suggested academically at-risk students and economically disadvantaged students may benefit most from growth mindset interventions** (Sisk, et al., 2018). Responding to those findings, Carol Dweck, who launched mindset research in education, highlighted that few interventions that meet accepted standards for rigor can show an impact on achievement at all, and those that do have small effect sizes but are

typically costly to implement (Dweck, 2018). In contrast, as discussed in Part 2 of this policy paper, mindset interventions can be brief, efficient, and inexpensive.

The mixed findings illustrate how the beliefs we carry, even those that may be unsupported by facts, are powerful, sensitive to context, triggered by circumstances and others, and often stubborn and difficult to change. It is possible that successful implementation in schools requires a comprehensive approach to adequately and sustainably shift the mindset students carry into the learning tasks they encounter. Additionally, **a growth mindset likely influences achievement through different motivation factors, such as goal setting and motivational orientation** (Burnette et al., 2013; Sorensen, 2016), and may depend on metacognition skills for a learner to enact a growth mindset effectively (Blackwell et al., 2007; Mercer & Ryan, 2009).

Finding 4: The beliefs we carry are powerful, sensitive to context, triggered by circumstances, and often difficult to change. Successful implementation in schools requires a comprehensive approach to adequately shift student mindsets.

WHAT ARE THE BENEFITS OF GROWTH MINDSET FOR STUDENT LEARNING AND OUTCOMES?

Although the findings on the benefits of growth mindset are mixed, some evidence suggests growth mindset can have a positive effect on student motivation, engagement, and learning through interventions. Not only can growth mindset affect academic achievement, but students with a growth mindset have greater confidence in their future academic performance, leading to higher expectations for themselves and better academic achievement (Plaks & Stecher, 2007). **Compared to students with fixed mindsets about ability, students holding growth mindsets like school more, take on more challenging tasks, learn more, and earn better grades** (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Romero et al., 2014). Growth mindset thinking and beliefs may lead to higher academic resilience and persistence in the face of challenging school transitions (e.g., Blackwell, Trzesniewski, & Dweck, 2007; Yeager & Dweck, 2012). Students holding a growth mindset report higher psychological well-being and school engagement (Zeng, Hou, & Peng, 2016) and tend to be more resilient in the face of setbacks and more interested in taking on challenges. They opt for difficult tasks to learn from rather than easier tasks where success is guaranteed (Spitzer & Aronson, 2015).

Finding 5: Some evidence suggests that growth mindset can have a positive effect on student motivation, engagement, and learning.

Finding 6: Growth mindset thinking and beliefs can counteract the negative effects of stereotypes.

Importantly, growth mindset thinking and beliefs can counteract the negative effects of stereotypes—especially important for students marginalized by biases due to race, ethnicity, ability, and culture. For instance, growth mindset can lessen the effect of stereotypes threats suggesting that African Americans are not smart, and women are not good at mathematics and science. As a result, the reduced effect of those threats can lead to improved performance on standardized tests for women and African Americans (Aronson, et al., 2002; Dweck, 2006).

Finding 7: Students with growth mindset beliefs may still engage in self-handicapping behaviors to protect their self-esteem when failure is likely.

It is also worth noting that research has shown that students holding a growth mindset still engage in self-handicapping behaviors (e.g., listening to distracting music or procrastinating preparation for a challenging task) as a means to protect their self-esteem when their self-esteem is highly contingent on their academic success (Niiya, Brook, & Crocker, 2010). Students holding a growth mindset, whose self-esteem was highly dependent on academic success, self-handicapped *more* before a difficult task than an easy task, and self-handicapped *more* than students with fixed mindset beliefs. Additionally, for students whose self-esteem was highly dependent on academic success, students with growth mindset beliefs practiced *less* before a difficult task than an easy task; these students practiced as few problems as students with fixed mindset beliefs when the task was difficult. Further, when students who were dependent on academic success for self-esteem and held growth mindset beliefs could not self-handicap, they were more likely to attribute their failure to their ability and exhibit lower self-esteem following the failure. Generally, these studies show that when students' self-esteem is highly dependent on academic success, students with growth mindset beliefs are still concerned about their self-worth and will self-handicap when failure is likely. They protect their self-esteem from the threat associated with failure (Niiya, Brook, & Crocker, 2010). This finding further highlights the complex nature of mindset, the interplay among the messages that students receive from a young age, and the difficulty in changing mindset with short interventions.

WHAT IS THE ROLE OF MINDSET ACROSS DEVELOPMENTAL PERIODS?

Although the theory of mindset has not linked the onset of implicit beliefs to a specific developmental period, some research suggests that mindsets are particularly influential during challenging academic transitions, such

as from primary into middle grades and throughout adolescence (Blackwell et al., 2007; Burnette et al., 2013). As an example, a large-scale longitudinal study of Turkish students ranging from Grade 4 through university found that mindset is fairly unchangeable across grade levels (Beyaztas & Hymer, 2018). Research has illustrated how mindset plays a role in the primary years regarding academic learning (Fraser, 2018) and in relationship to social skills (Yeager, 2017). The large body of research on mindset covers childhood to adulthood and suggests these beliefs play a role in motivation, engagement, and learning across the lifespan, to some extent.

HOW IS MINDSET VIEWED ACROSS GLOBAL CONTEXTS?

Similar results between growth mindset and academic achievement have been found across the world. A number of studies have demonstrated a positive relationship between mindset and academic achievement in a number of countries, including Australia (Bostwick, Collie, Martin, & Durksen, 2017), China (Wang, Yuan, & Wang, 2020), Chile (Claro, et al., 2016), England (Rienzo, Rolfe, & Wilkinson, 2015), Norway (Bettinger, Ludvigsen, Rege, Solli, & Yeager, 2018), Turkey (Beyaztas & Hymer, 2018), South Africa (World Bank, 2018), and the U.S. (e.g., Blackwell et al., 2007). For example, according to the 2018 PISA results, PISA findings generally supported the idea that students' growth mindset resulted in better academic performance. However, this was not true for all countries. For example, Chinese students who had a fixed mindset scored higher in PISA reading than those who had a growth mindset. Results from only 4 out of 70 participating education systems (i.e., China, Hong Kong, Lebanon, and North Macedonia) showed no relationships or a negative relationship between growth mindset and academic performance (Zhao, 2020). In another study of Chinese adolescents, Wang, Yuan, and Wang (2020) demonstrated that **growth mindset predicted academic achievement in adolescents who also held high self-affirming beliefs. However, growth mindset did not predict achievement for students with low self-affirming beliefs, indicating that growth mindset beliefs may interact with other self-beliefs to affect outcomes.** Further, Claro and colleagues (2016) showed that growth mindset exhibits a positive relationship with achievement across all socioeconomic strata for Chilean students. This global research on mindset suggests the implicit theories about abilities we carry and engage in teaching and learning may have universal relevance.

1.5. HOW CAN SCHOOLS MEASURE AND TRACK DEVELOPMENT OF GROWTH MINDSET?

To track mindset systematically, researchers and schools typically use a self-report survey instrument that gauges individuals' beliefs and perceptions based on level of agreement. The most common measures of growth mindset were developed by Dweck (1999; 2006; 2008) and range from 3 to 20 items (see Annexes, Table1). Most of the measures consist of two subscales: one for growth mindset and one for fixed mindset. Subscales typically have an equal number of items and scores from fixed mindset items can be reversed and summed with growth mindset items to calculate an overall mindset score. Response scales range from scales

with 4–6 response options. The more students agree with statements about the malleability of an attribute, the more of a growth mindset they hold. An example of a fixed mindset statement is "You have a certain amount of intelligence, and you can't really do much to change it." A sample item scored for growth mindset is "No matter who you are, you can significantly change your intelligence level" (Dweck, 1999; 2006; 2008). Growth mindset instruments have been successfully administered to a range of age groups from children as young as 10 years old to adults. Further, growth mindset instruments have been translated into various languages, including Chinese (Wang, Yuan, & Wang, 2020), Norwegian (Bettinger, et al., 2018), Spanish (Claro, et al., 2016), and Turkish (Beyaztas & Hymer, 2018).

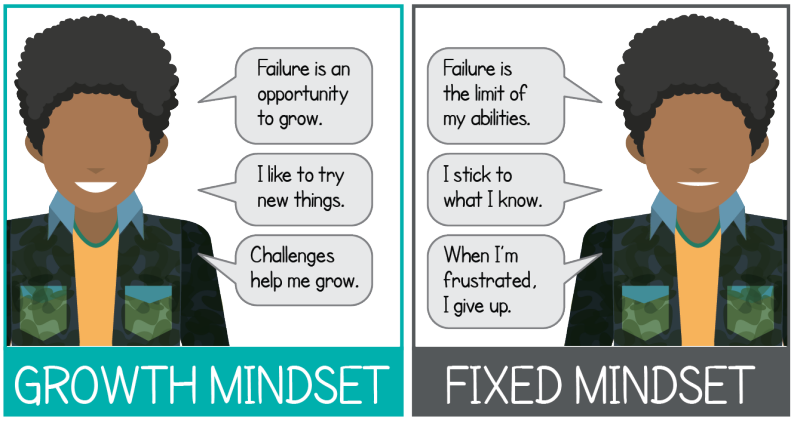
More recently, scales have been developed and used for different kinds of abilities, such as creative potential (Hass, Katz-Buonincontro, & Reiter-Palmon, 2016), to focus on the distinction between our fixed and growth mindsets about abilities of others and our own abilities (De Castella & Byrne, 2015). That distinction may be important to differentiate students who may believe that others' can grow their ability, but their own abilities are fixed. Those situations may indicate other types of low self-beliefs that can interact with mindset. Additionally, scales can use vignettes to anchor and contextualize mindset thinking and beliefs to a specific situation. This kind of situational judgment (Anderson, Thier, & Pitts, 2017) can provide more precise understanding of the contexts where students may hold a fixed mindset (e.g., mathematics or art class) and other contexts where they may hold a growth mindset (e.g., dance or language acquisition).

Table 1. Description of Mindset Measures.

Scale	Items	Scale
Dweck's Theory of Intelligence Survey (Dweck, 1999)	6 items: 3 for growth mindset and 3 for fixed mindset	6-point scale, ranging from 1 (strongly agree) to 6 (strongly disagree).
Growth Mindset Scale, also called the Dweck Mindset Scale (Dweck, 2006)	3 items for fixed mindset	6-point scale, ranging from 1 (strongly agree) to 6 (strongly disagree)
Growth Mindset Scale, also called the Dweck Mindset Scale (Dweck, 2008)	20 items: 10 for growth mindset and 10 for fixed mindset	4-point scale, ranging from 0 (strongly disagree) to 3 (strongly agree).

Note. The Project for Education Research that Scales (PERTS) uses the three fixed mindset items from the Theory of Intelligence Survey (Dweck, 1999; PERTS, 2015).

In the classroom environment, observing for different types of student language and behaviors can provide an informal assessment of students' mindset, indicating what kind of mindset students may be holding in response to certain materials or tasks. When holding a fixed mindset, students may be more likely to make statements like, "I'm just not good at mathematics," "I'm never going to get this," "This is too hard," or "It's easy for her; she's smart." However, students with a fixed mindset may also make statements like, "I am awesome at this," "This is easy," or "I'm just good at science." Additionally, students with fixed mindset beliefs may only choose tasks in which they know they can succeed, give up on a challenging task easily, hesitate to answer a question publicly for fear of looking stupid, or appear frustrated quickly when they struggle to figure out a concept or skill. Students with a fixed mindset may also engage in problematic, distracting, or avoidant behaviors when they are presented with tasks at which they do not feel they will be successful. If teachers develop a sensitivity to these cues, they can address them with care, messaging, and attention. Knowing the avoidance and self-handicapping behaviors that result from fixed mindset beliefs about ability equips teachers to respond and disrupt those beliefs with clear modeling and consistent messaging and feedback.



1.6. CONCLUSION

Although the research around growth mindset is mixed, it has grown in its popularity and has been widely accepted by educators, incorporated in educational policies, and implemented emphatically in classrooms across the world with students of all ages. Students' mindsets influence their attitudes toward learning and their actions and behaviors, which ultimately affect their academic achievement. Additionally, students holding growth mindset beliefs tend to have more positive attitudes toward school, higher academic confidence and psychological well-being, increased motivation and school engagement, and higher academic resilience and persistence. Research has shown that mindsets are particularly influential during challenging academic transitions, such as from primary into middle grades, and throughout adolescence. Further, results suggest academically struggling students and economically marginalized students may benefit most from growth mindset interventions.

PART 2.
POLICIES, PRACTICES, AND PROGRAMS TO DEVELOP GROWTH MINDSET

This part of the policy paper covers policies, practices, and programs developed in K–12 education around the world to support growth mindset development in students and the educational stakeholders that support them. Given that growth mindset has largely developed through research with Western cultures, the policies, practices, and programs reviewed here are heavily influenced by Western culture and may not be received in the same way when implemented with other cultural contexts.[1] It is important to consider cultural norms and expectations and inquire within a specific school whether adaptations are needed to the presented policies, practices, and programs to be successful in that particular context.

2.1. WHAT ARE THE POLICIES THAT SUPPORT A GROWTH MINDSET?

Given the number of mindset-related messages students receive from the people in their lives (e.g., school leaders, teachers, parents, peers, and social media communities), it is important that there is alignment across the messages that students receive and that the messages support a malleable view of general intelligence and ability across disciplines. Because of the complex nature of how perceptions are formed, shaping mindsets requires a systems-level approach. **Unfortunately, fixed mindset beliefs are ingrained in many societies—in how we think about, teach, and communicate with students**. Parents encourage their toddlers with praise focused on how "smart" they are and how "good" they are at certain tasks (e.g., stacking blocks or completing puzzles). Children start to identify with these labels and accept them as part of their identity—traits that cannot be changed. Once students enter the education system, they are evaluated, labeled, and tracked throughout their academic career. The beliefs that school leaders and teachers carry are intertwined with ethnicity, gender, socioeconomic status, and other stereotypes. These messages also get passed on to students (e.g., girls are not usually good at mathematics). Messages and views conveyed by teachers, parents, and peers throughout the educational process often focus on intelligence, ability, and talent, implying that ability is something students have or not (Youth Development Executives of King County & The Road Map Project, 2014). **Dweck points out that "young people can become dependent on praise, fearful of challenges, allergic to effort, and demoralized by critical feedback"** (Dweck, 2008, p. 58).

[1] Fundamental ideas ingrained in the recommended policies, practices, and programs may contradict cultural beliefs about human nature, learning, the role of education, and the role of parenting in various cultures.

EXAMPLES OF INCORPORATING GROWTH MINDSET INTO EDUCATIONAL POLICIES

Although the direct effects of policy on the growth mindset of teachers and students have not been studied, examples of philanthropic organizations, research centers, education agencies, and specific schools exist to illustrate implementation of initiatives to support growth mindset development in students. For example, fostering academic mindsets is an explicit component of the Collaborative for Academic, Social, and Emotional Learning (CASEL) Guide to Schoolwide Social and Emotional Learning (CASEL, 2020). Additionally, the Human Sciences Research Council (HSRC) has proposed the inclusion of growth mindset in South Africa's educational policies and practices. Specifically, HSCR advocates the integration of growth mindset into professional development programs at national, provincial, and district levels and encourages policymakers to debate the merit of replacing failing grades (D and F) with NY (Not Yet) in the grading system (Yu, Frempong, Winnaar, 2015). Further, philanthropic organizations have developed programs to facilitate the implementation of growth mindset thinking worldwide. For example, Alwaleed Philanthropies (2015) launched the National Growth Mindset Initiative, called Yanmu, to shift mindsets in Saudi Arabia.

Government education agencies have also advocated for the inclusion of growth mindset-related teaching and learning. The Florida Department of Education website includes an extensive collection of growth mindset resources for teachers in the Just for Teachers Community (FLDOE, 2020). Similarly, the Western Cape Education Department in South Africa provides growth mindset resources on their website (Western Cape Education Department, 2020). The California Office to Reform Education (CORE) districts in California include surveys of student social-emotional learning as part of their School Quality Improvement System. Students in Grades 5–12 are asked to self-report on a series of social- and emotional learning factors, including growth mindset. This initiative includes eight very large school districts—approximately 1,800 schools, 56,700 educators, and more than a million students (CORE Districts, 2017). The aim of that accountability system innovation is to raise awareness and efforts toward growth mindset by measuring what matters.

In the United Kingdom, more than 100 schools have adopted written policies supporting growth mindset. The goal of these policies is to ensure consistency in the approach to growth mindset across schools in order to promote a growth mindset culture through their use of language, by modeling and managing behavior, and by organizing teaching and learning (Rienczo, Rolfe, & Wilkinson, 2015). Additionally, in collaboration with the Abdul Latif Jameel Poverty Action Lab (J-PAL) and Innovations for Poverty Action (IPA), the Ministry of Education in Peru created MineduLAB, an innovation hub that designs, evaluates, and scales effective solutions to educational challenges. MineduLAB is currently working with implementers to design the scale-up of their Growth Mindset intervention (Abdul Latif Jameel Poverty Action Lab, 2020). Further, the New South Wales Government is advocating that Australian schools consider placing more emphasis on non-cognitive skills, such as a growth mindset and reducing the Higher School Certificate (HSC; Koziol, 2018). Moreover, the National

Institute of Education (NIE) in Singapore has explicitly incorporated growth mindset training into their Introduction to Teaching Programme, administered by the Academy of Singapore Teachers (AST; National Center on Education and the Economy, 2016).

ESTABLISH GRADING AND TESTING POLICIES THAT SUPPORT A GROWTH MINDSET

The messages that school grading and testing structures send may be counterproductive for the development of a growth mindset for students. Most educational systems are built around labeling students based on their test scores and praising students for their high performance (Youth Development Executives of King County & The Road Map Project, 2014). In this way, the educational system is structured to help students *discover* both their abilities and their limitations, signaling fixed entity beliefs about ability. That assessment and diagnostic approach does not often reinforce a message to students that their knowledge and skills can be developed through effort and hard work. Students learn material, submit assignments, receive a grade, and then move on to new content, whether or not they mastered the current topic or can solidly identify their growth from the beginning of the course or school year.

The requirements caused by these constraints often create misalignment between educator mindset and their behaviors as leaders and teachers. This could explain the weak relationship between educator and student mindsets (Chaucer, 2013; Wagner, 2014). **For example, one study revealed minimal connection between school leader beliefs in growth mindset, their leadership behaviors, and school-level student achievement scores in New York primary schools in the U.S.** (Chaucer, 2013). Another U.S. study found no relationship between principal behaviors and mindset in schools across Pennsylvania (Wagner, 2014). Similarly, a third study showed, although teachers may hold a growth mindset view of their students, their classroom practices do not align with these beliefs due to constraints they face within the education system (Rattan et al., 2012). As a result, students may not perceive teachers as having a growth mindset. Yet another study revealed that even when teachers felt prepared to implement growth mindset, educational structures, school leaders, parents, and college admissions requirements were too focused on grade-point averages. Teachers felt they needed continued professional development to assist students effectively in the development of a growth mindset and reduce their focus on grade-point averages (Delasandro, 2016).

Just as research indicates mixed results between mindset of students and their academic achievement, the mindset of adults in a school may face conflicting policies, practices, and structures to actually affect leadership, teaching, and classroom conditions for students. In that way, teachers may recognize the contradictory structures that reinforce fixed mindsets in their school and feel the need for more support to address those conflicts as they shift their own beliefs and try to shift those in students. This is an ongoing challenge that educators face as they encourage growth mindset thinking in their students.

2.2. WHAT ARE THE PROMISING PRACTICES THAT SUPPORT A GROWTH MINDSET AT THE SCHOOL AND CLASSROOM LEVELS?

There are mixed opinions on the role of teachers and school leaders in facilitating a growth mindset. Intuitively, it makes sense that educator mindsets would influence student mindsets. Some research has shown that teachers' and school leaders' mindsets affect student mindsets and their academic achievement (e.g., Esparza et al., 2014; Hubacz, 2014; Schools, 2014). For example, an in-depth case study of U.S. schools in Texas found that secondary schools can address gaps in student achievement, especially with traditionally underserved student populations, by developing policies and practices that help students take ownership and responsibility for their own learning and growth (Cannata, Smith, & Haynes, 2017). Although the evidence is mixed and more research is needed in the future, there are a number of promising practices that school leaders, teachers, parents, and students can implement to support a growth mindset in students. Additionally, many of the strategies noted for one group could easily be applied to other groups. This section describes key practices for school leaders, teachers, families, and students.

SCHOOL AND CLASSROOM PRACTICES THAT SUPPORT GROWTH MINDSET

Although researchers have not studied the impact of modifying school policies to support growth mindset directly, they have examined the extent to which existing school policies support or hinder the develop of students' growth mindsets. Key characteristics of school policies that facilitate a growth mindset include building a culture that fosters growth mindset among staff and students and consistency of messaging about growth mindset across the system (e.g., school leaders, teacher, parents, students, and peers).

BUILD A SCHOOL CULTURE THAT FOSTERS GROWTH MINDSET

As can be expected, school environment and culture have a large impact on teacher and student mindsets. As such, one key strategy for facilitating growth mindset in students is to build a school culture that is safe and supportive. There are five key characteristics of a growth mindset supportive school culture:

- shared leadership,
- open communication,
- professional collaboration and a culture of shared adult learning,
- clear and realistic goal setting and support for teachers as learners, and
- support for and valuing of all students as learners (Blackwell, 2012).

These characteristics are common for any supportive school culture. However, schools with these characteristics are more likely to foster growth mindset thinking and beliefs, as well as other benefits for students' learning and wellbeing.

The shared leadership model provides opportunities for school staff to have input in areas where they have interest and skill. It also provides opportunities for school staff to develop their capacities, modeling and reinforcing that abilities are malleable. Additionally, open communication is a cornerstone in growth mindset culture, ensuring that all school staff receive honest feedback in a nonthreatening environment with the goal of improving student learning. A school culture that supports professional collaboration and adult learning also engrains growth mindset into teachers' practices. **When teachers are given the opportunity to learn from each other, they tend to be more effective, more dedicated, and report more job satisfaction.** A growth mindset culture also provides clear and realistic goal setting and support for teachers as learners. Teachers should be encouraged to set clear goals and develop a plan to achieve them. More importantly, the teacher evaluation process should provide formative feedback and not simply result in high-stakes summative evaluations (Blackwell, 2012).

One of the strongest signs of a growth mindset culture is that teachers support and value all students as learners who can improve their skills, knowledge, and attitudes. To be successful, teachers should believe that they can help all students succeed and continually work to help and encourage students to face and overcome their challenges. If teachers do not feel this way, they may give up on certain students or blame them for their lack of progress (Blackwell, 2012). Teachers and other school staff should continuously model and reinforce the idea that all students can improve their abilities through effort. Further, to sustain a growth mindset, students need to feel that is it acceptable to fail and that it does not reflect poorly on their potential to succeed. Creating and sustaining a school culture that fosters growth mindset contributes to more motivation and engagement among students, as well as increased academic success (Youth Development Executives of King County & The Road Map Project, 2014).

PROVIDE TRAINING TO ADULTS TO ENSURE CONSISTENCY IN GROWTH MINDSET MESSAGING

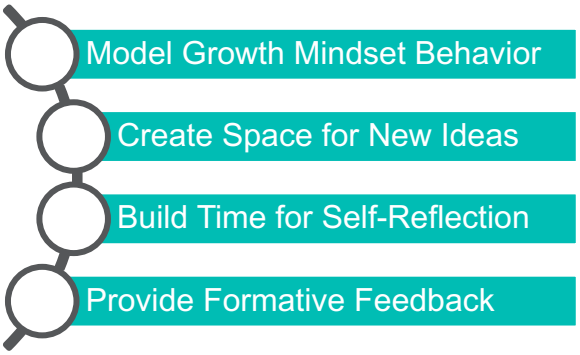
Students receive messages about their abilities from a variety of sources. They incorporate this information into their own view of their abilities. Thus, it is important that students are receiving consistent messages from school leaders, teachers, parents, and peers that ability is malleable and growth comes from effort. As such, growth mindset initiatives typically begin with the training of school staff. **Ultimately, the goal of these training programs is to shift the mindsets of school staff and influence how they interact and communicate with students, both verbally and nonverbally.** Growth mindset initiatives teach school staff to encourage students for their effort, persistence, or strategies used. This implicitly reinforces a growth mindset by shifting the focus to effort, instead of talent or natural ability. It is important that growth mindset initiatives address the attitudes of school staff (e.g., school leaders, teachers), as well as students. Further, schools should

It is important that growth mindset interventions address the attitudes of school staff, as well as students.

connect with families and community members on the importance of growth mindset beliefs in success. The school could provide informational sessions to parents and school leaders, and teachers can incorporate growth mindset language in their communications with parents. Moreover, ongoing training for school staff, parents, and students is helpful for automating growth mindset thinking and actions across different contexts and circumstances. Growth mindset messages are most effective when they are consistent across contexts (Youth Development Executives of King County & The Road Map Project, 2014). **Thus, integrating growth mindset thinking into the school culture and aligning the messages that students receive about their abilities across influential adults in their lives could be an effective strategy for facilitating growth mindset thinking in students.**

SCHOOL LEADER PRACTICES THAT SUPPORT A GROWTH MINDSET

Heggart (2015) proposed a framework for how school leaders could support a growth mindset in teachers and other school staff. Suggested strategies relate to modeling growth mindset behavior, creating spaces for new ideas, building time for self-reflection, and providing formative feedback (Heggart, 2015).



PROMISING PRACTICE 1: MODEL GROWTH MINDSET BEHAVIORS

School leaders should model the growth mindset behaviors they want to see in teachers. School leaders who model growth mindset thinking influence teachers to adopt growth mindset thinking, which, in turn, influences students to adopt growth mindset thinking (Heggart, 2015). Research has shown that, even when school leaders did not report having a growth mindset, leaders who modeled growth mindset behaviors were able to create a school culture that supported growth mindset thinking (Wagner, 2014). This finding suggests that it may not be necessary for school leaders to hold a growth mindset, as long as they exhibit the behaviors associated with growth mindset thinking (Anderson, 2016; Wagner, 2014).

PROMISING PRACTICE 2.
CREATE A SPACE FOR NEW IDEAS

School leaders should create a safe space for new ideas. If school leaders want teachers and students to embrace growth mindset thinking, teachers and students need to feel comfortable taking risks and trying new things (Heggart, 2015). They need to feel that school leaders value the learning process and risk-taking, instead of just the success of the final results (Heggart, 2015). Teachers feel comfortable taking instructional risks when the school culture encourages learning and improvement and does not only judge mistakes negatively (Dweck, 2006; Heggart, 2015). In addition to establishing a safe environment for sharing ideas, school leaders should also build in structures that support teacher learning (e.g., professional learning community, communities of practice, and content teams). School leaders can communicate with teachers using growth mindset language (Heggart, 2015). One example is to add the word "yet" at the end of a statement. For example, rather than saying that a teacher "did not meet a goal", the school leader could say that "the goal has not been met *yet*". This difference emphasizes implicitly that the teacher can still make progress with additional time and effort (Thierolf, 2015).

PROMISING PRACTICE 3:
BUILD TIME FOR SELF-REFLECTION

School leaders should provide time for self-reflection. Teachers and students need to have opportunities to reflect (Heggart, 2015)

- on learning experiences,
- on improvements and challenges, and
- on the possible next steps to keep improving.

Generally, teachers are more likely to hold a growth mindset when they have time to reflect on the progress they have made (Heggart, 2015) and believe that they are capable of making more progress in the future (Dweck, 2006). Additionally, providing opportunities and supports for teachers to work through frustrations and shift their interpretation of challenges from failure to learning opportunity can encourage growth mindset thinking in teachers (Dweck, 2006; Heggart, 2015).

PROMISING PRACTICE 4: PROVIDE FORMATIVE FEEDBACK

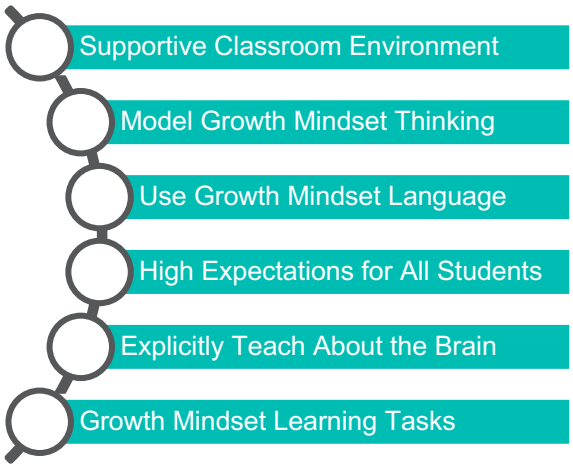
School leaders should provide specific formative feedback to help teachers improve (Dweck, 2006; Heggart, 2015). School leaders should build in opportunities for teachers to seek and use feedback that they deem valuable and meaningful. This step requires a safe and supportive school environment that values constructive feedback, transparency, and honesty. **Feedback and evaluation that is only high-stakes and summative encourages fixed mindset beliefs and can cause anxiety in teachers** (Dweck, 2006). However, formative feedback that is part of the learning process promotes a growth mindset and is often received better by teachers. Further, the issue is less about school leaders providing feedback and more about creating an environment where the feedback feels actionable, formative, valued, and an essential piece of the learning process (Dweck, 2006; Heggart, 2015).

TEACHER PRACTICES THAT SUPPORT A GROWTH MINDSET

In a national study of more than 600 K–12 teachers conducted by the Education Week Research Center, 98% said they believed building growth mindset thinking and beliefs into their classrooms would improve student learning. However, many teachers feel they are not adequately trained to facilitate growth mindset thinking in their students. Only 20% of surveyed teachers reported strongly believing they were good at fostering growth mindset, and 85% of surveyed teachers reported they wanted more professional development in this area (Education Week Research Center, 2016). Further, simply shifting teacher beliefs that student abilities are malleable does not predict students' mindsets (Sun, 2015). Many teachers attempt to instill growth mindset thinking by focusing on changing students' beliefs without also changing their teaching practices to create an environment that supports growth mindset thinking. This is problematic because it shifts the responsibility solely to the student and may result in teachers blaming students for their lack of success (Dweck, 2015).

Teachers holding a fixed mindset may more readily judge students than teachers with growth mindset, leading to implicit and explicit messaging and perceptions about students' capability to succeed. In one study, **fixed mindset teachers were more likely to use "kind" strategies (e.g., assigning less homework) and provide comforting but contradictory feedback to students (e.g., feedback like, "it's okay, not everyone can be good at mathematics")**. Students who received this type of feedback not only perceived that their teachers had lower expectations, but also reported lower motivation and lower expectations for their own performance (Rattan, Good, & Dweck, 2012). Possibly due to the durability of their self-beliefs, gifted and talented students seem to be less affected by teacher mindset than the general student population (Esparza, Shumow, & Schmidt, 2014). Some evidence suggests that teachers' praise for ability (e.g., "you're so smart!") may undermine students' resilience in learning; conversely, praising effort and inferring that ability can be improved (e.g., "you worked really hard!") fosters greater resilience in children (Mueller & Dweck, 1998). For example. Dweck has noticed a

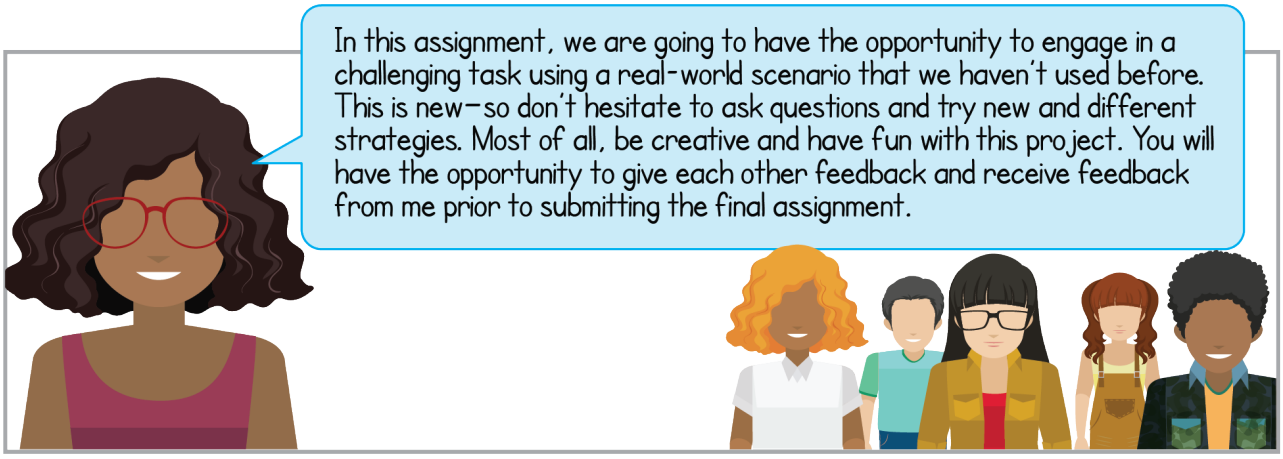
trend of "false growth mindset," in which educators and parents are misunderstanding the core message (Gross-Loh, 2016). They believe that growth mindset is only about effort and encouraging students to try harder. Thus, teachers started praising students for effort, when the effort may not have been effective (e.g., the student still failed). **Students know that if teachers are praising them, but they did not make progress, the praise is an empty consolation prize and it conveys the message that the teacher believes they cannot do any better. The key is to praise the effort that contributed to learning progress.** Unfortunately, growth mindset has been misappropriated to make students feel better when they are not achieving—and that goes against the core of growth mindset (Gross-Loh, 2016). This issue further highlights that the feedback and messaging teachers provide students play a role in students' mindset development and persistence through challenges.



There is an abundance of recommendations in the literature to guide teachers in encouraging growth mindset in their students. When used strategically and consistently, these strategies could push students to embrace challenges, persevere, and use feedback for growth (Dweck, 2006). By making simple changes in the classroom, teachers can foster an environment in which students not only understand what growth mindset is, but also adopt growth mindset thinking and beliefs to direct their own behaviors. Promising practices include establishing a classroom environment that supports growth mindset, modeling growth mindset thinking, using growth mindset language, establishing high expectations for all students, explicitly teaching students about the brain, and structuring learning tasks to support growth mindset.

PROMISING PRACTICE 5:
ESTABLISH A CLASSROOM ENVIRONMENT THAT SUPPORTS GROWTH MINDSET

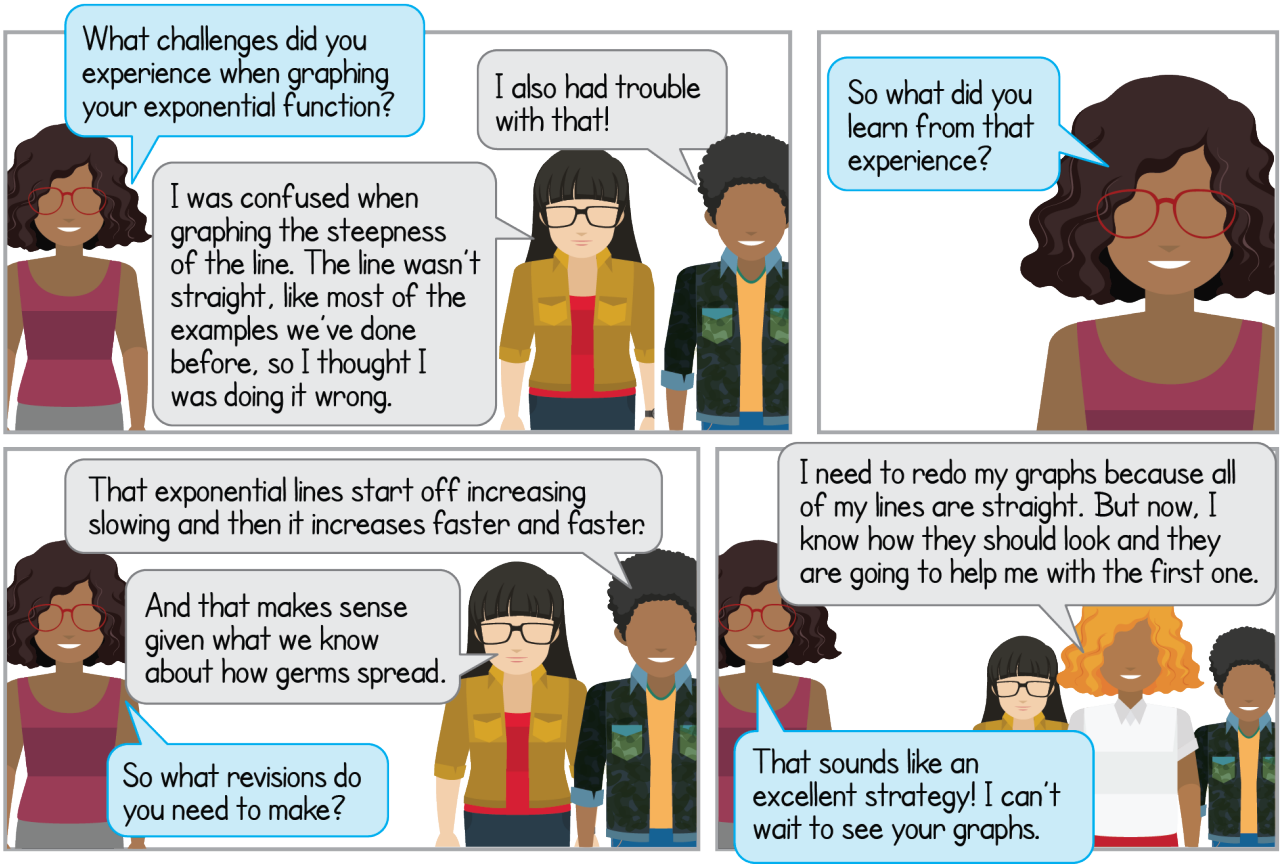
Learning Context: A teachers assigns upper elementary students a mathematics investigation on the exponential spread of a global pandemic. Students are asked to (a) use data provided by a publicly available website to calculate the overall rate at which the pandemic is spreading, (b) select and calculate the specific rates for three countries with publicly available data, (c) graph the overall and country rates over a three month period, and (d) briefly summarize and interpret the information.



One of the most effective strategies for fostering growth mindset thinking in students is to establish a classroom environment that supports a growth mindset. Like teachers, students need a safe and supportive environment to feel comfortable taking risks, trying new things, and overcoming the challenges they experience (Dweck, 2006). Teachers should let students know, explicitly, that taking risks in learning is important and that the classroom is a safe place to do so. Teachers can also celebrate these behaviors in their students to encourage future risk-taking. Establishing a growth-oriented classroom environment can entail messaging through visuals on classroom walls. For instance, teachers can create an exhibition of student work that includes "beautiful mistakes" or early drafts of student work alongside the finished product. Visuals can also remind students about the number of failed attempts that scientists and inventors face in their work. Importantly, how teachers frame feedback and emphasize opportunities in mistakes sets growth-oriented conditions.

PROMISING PRACTICE 6:
FRAME MISTAKES AS IMPORTANT FOR LEARNING

Learning Context: As students finish their first drafts of the project and seek feedback from their peers and the teacher, the teacher asks them to share some of the challenges they experienced, what they learned, and how they were going to incorporate that into their revisions.



To help students reframe setbacks through a growth mindset, teachers should reinforce learning as a process and highlight the role effort and mistakes play in learning (Dweck, 2006; Ostroff, 2016). Dweck (2006) stresses the value of effort and the importance of recognizing when students are trying. Learning new material takes hard work, time, and effort. Students holding fixed mindset beliefs think that if something is hard, they are not smart enough to do it, and they may give up. Teachers can communicate it is natural for new skills to feel hard at first and they become easier with practice (Dweck, 2006).

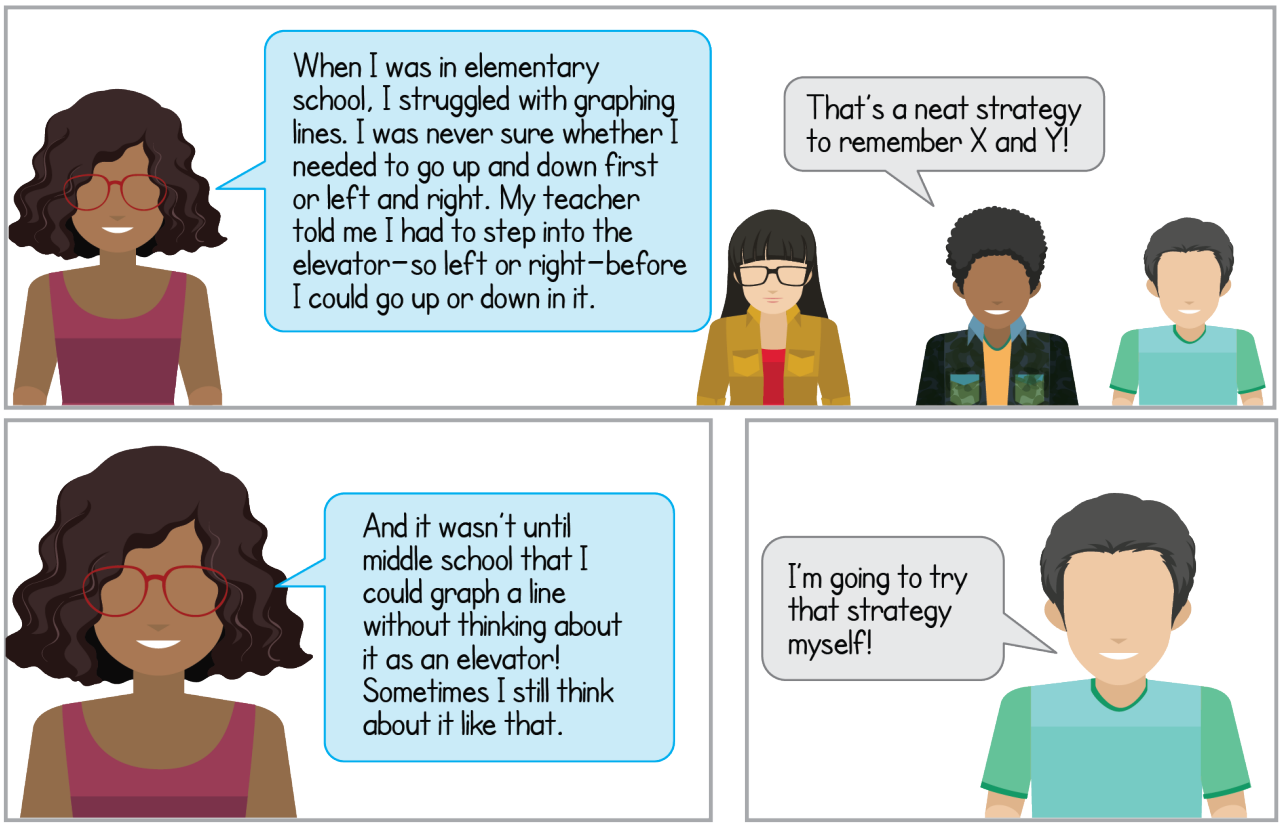
Further, teachers can frame mistakes and struggles as an important part of learning. Teachers should let students struggle to build the skills for academic resilience. While this point may be challenging for caring educators, productive struggle teaches students the process of trial and error. Experiencing challenges will foster a sense of accomplishment when they do complete the task and will teach persistence and increase confidence

when approaching difficult situations in the future (Dweck, 2006). The way in which teachers communicate with students influences how students view setbacks, struggles, and failures (CASEL, 2020).[2] There are a number of strategies that teachers can use to help students frame mistakes and struggles as part of the learning process. For example, teachers can provide opportunities for students to correct errors and revise work (CASEL, 2020). That encouragement propels students to focus on mastery of the concepts, instead of concerning themselves only about the grade they receive. Teachers can also use parent-teacher conferences as an opportunity to raise awareness among parents about growth mindset and to frame effort and mistakes as important aspects of the learning process (CASEL, 2020). One technique is to allow students to lead parent-teacher conferences and present evidence of their improvement in a skill during the term.

[2] See more tips from CASEL at https://schoolguide.casel.org/focus-area-3/classroom/integration-of-sel-and-instruction/fostering-academic-mindsets/

PROMISING PRACTICE 7: MODEL GROWTH MINDSET THINKING

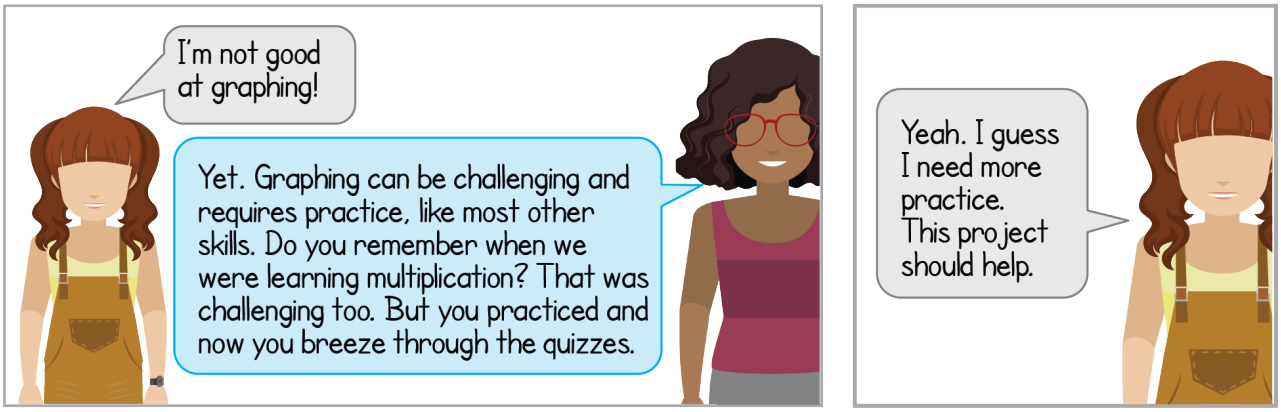
Learning Context: During the conversations with students, the teacher realized that students were struggling with graphing the exponential lines. Thus, she shared her personal experiences with graphing in elementary school to model that graphing can be challenging, but it is a skill that requires practice.



Teachers can model growth mindset thinking for their students, explicitly, to develop metacognitive knowledge about these key beliefs. Teachers can discuss the mistakes or struggles they have experienced and their mindset thinking related to these challenges (CASEL, 2020). Teachers could provide examples of feeling like they were not good at mathematics when they were growing up or how they struggled with reading, which made it difficult to complete their homework. When teachers talk about their mindsets, students begin to realize that it is acceptable to struggle. This also helps create a safe environment for students to share their mistakes and challenges (CASEL, 2020; Dweck, 2006). Further, teachers can assign books with characters who face challenges and develop strategies to overcome them (Lexia Learning, 2020).

PROMISING PRACTICE 8: USE GROWTH MINDSET LANGUAGE

Learning Context: In a second round of revisions, one student was feeling frustrated about the line not being graphed correctly. The student expressed fix mindset language, and the teacher prompted students to practice growth mindset thinking.



The way teachers praise and provide feedback to students can affect their mindset. Dweck (2006) discusses two types of praise that teachers provide: person-oriented praise and process-oriented praise. **Person-oriented praise, such as "you are smart," suggests that abilities are traits that students either have or do not.** Person-oriented praise encourages fixed mindset beliefs and can undermine academic performance (Dweck & Mueller, 1998). **Process-oriented praise, such as "you worked hard on that assignment," focuses on the process of learning and highlights effort, persistence, and use of strategies** (Dweck, 2006). Process-oriented praise encourages growth mindset beliefs.

Simple changes in framing of praise and encouragement has been shown to improve students' response to failure, persistence, and enjoyment in their work (Dweck, 1999; Mueller & Dweck, 1998). Teachers should praise the learning process and can use statements like, "I'm proud of you for trying more than one strategy" or "The point of the assignment is to grow your understanding. I like that you didn't give up." Dweck (2014) also encourages teachers to embrace the word "yet." When students struggle or experience failure, teachers can provide feedback that suggests they have not mastered the skill yet. Including *yet* or *not yet* implies that students can master the material if they continue to be strategic, give effort, and persist (Dweck, 2014). Teachers can point out other moments when the student gave effort and developed mastery to help cement a growth mindset in that moment. Students can create growth mindset posters that include inspirational quotes or feature growth mindset language (Lexia Learning, 2020).

PROMISING PRACTICE 9: ESTABLISH HIGH EXPECTATIONS FOR ALL STUDENTS

Teachers can help foster growth mindset thinking by establishing high expectations for all students. When teachers set a high standard for all students and provide assurance and supports that all students can achieve these standards, students are more engaged and responsive to critical feedback (Yeager et al., 2014). Additionally, when students know their teachers have high expectation of them, they will raise their expectations of themselves (Farrington, et al., 2012).

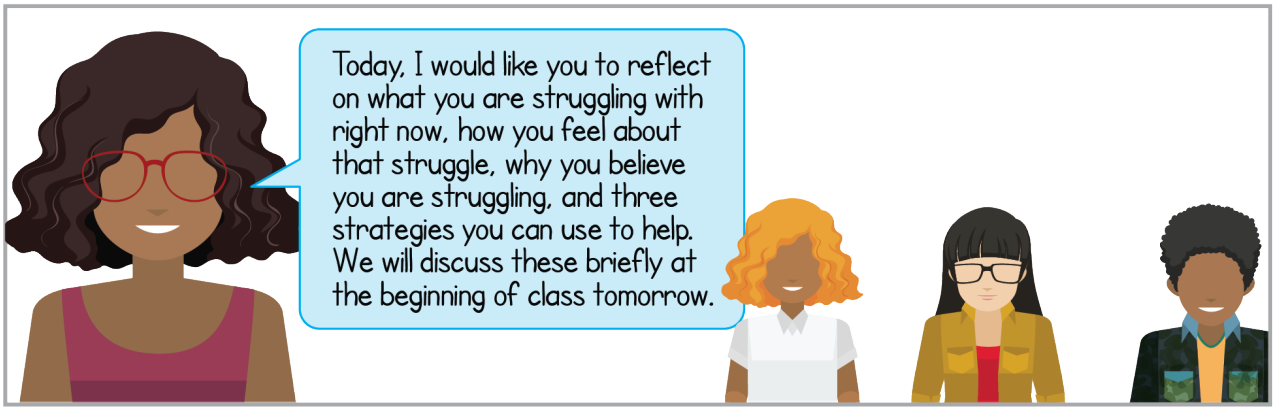
PROMISING PRACTICE 10: EXPLICITLY TEACH STUDENTS ABOUT THE BRAIN

Dweck (2006) recommends teachers explicitly teach students about the neuroplasticity of the brain and the process that the brain undergoes when students learn something new as a strategy for fostering growth mindset thinking. Developments in neuroscience suggest that the brain is more malleable than originally thought. Research on brain plasticity has shown that the brain's connections can change with experience. Practice can strengthen existing neural connections and build new connections. This research demonstrates that neural connections are affected by using good strategies, asking questions, practicing, and following good nutrition and sleep habits (Mindset Works, 2017b).

Teaching students they have control over growing and changing their brains through their actions empowers students and increases motivation and achievement (Dweck, 2006). Additionally, students who understand how the brain works are more likely to take ownership of their own learning (Dweck, 2007). Dweck (2006) suggests that explicitly teaching about the brain can be accomplished through mindset lectures that focus on how the brain forms connection and how thought patterns facilitate growth mindset beliefs (Dweck, 2006). Most of the programs designed to increase growth mindset beliefs include an element of explicitly teaching about the brain (e.g., Mindset Works, 2017c; Rienzo, Rolfe, & Wilkinson, 2015; World Bank, 2018).

PROMISING PRACTICE 11: STRUCTURE LEARNING TASKS TO SUPPORT GROWTH MINDSET

Learning Context: Throughout the project, the teacher used different writing prompts for the end-of-class activity to provide students the opportunity to reflect on their mindset for the day.



Perhaps one of the most flexible strategies that teacher can use for fostering growth mindset thinking is to embed these ideas into their learning tasks (e.g., CASEL, 2020; Dweck, 2006; Lexia Learning, 2020). The structure of learning tasks and the goals that the teacher emphasizes conveys specific messages to students about abilities (e.g., Sun, 2015). Teachers can implement specific activities in their classrooms that shift mindset thinking in their students. **One strategy that teachers can use is to implement open-ended task structures.** Open-ended tasks are learning activities that have more than one correct answer and have more than one correct way to arrive at the answer (Sun, 2015). For example, teachers can ask students to select a skill they consider themselves to be good at (e.g., riding a bike, swimming, reading) and then write about the effort it took to master the skills (Anderson, 2016).

Teachers can also include learning tasks that involve setting goals and using reflection and journaling. Teachers can encourage growth mindset and emphasize the link between effort and learning by building in time for students to set goals for themselves. Students should write their goals, develop an action plan for accomplishing the goals, and set a reasonable timeline for accomplishing their goals. Students can journal as a way to monitor and reflect on their progress. Teachers could incorporate activities to provide students the opportunity to reflect on their learning, such as journal entries, warm up activities, or exit tickets (Lexia Learning, 2020). Teachers can provide reflection prompts for students, such as the following:

- What learning tasks required the most effort to complete and how did I feel about them?
- What new strategies did I try today? What other strategies could I try to help me learn more about the topic?
- What mistakes did I make and what did I learn from the mistakes?

- What am I struggling with right now? What are three strategies I can use to help me?
- What questions do I still have?
- What do I want to learn by the end of the week?

Teachers can also facilitate growth mindset thinking in their students by providing opportunities for them to analyze errors that they have made (Boaler, 2009, 2013; Dweck, 2006). Additionally, teachers can allow students to use feedback to make continuous revisions to work until they achieve mastery (Ostroff, 2016). Teachers can also provide opportunities for students to reflect on their own mistakes or struggles (CASEL, 2020).

The structure of learning tasks can help develop students' learning stamina. Teachers can encourage students to work on a project for a short period of time, and then slowly increase the amount of work time until they achieve the targeted length. For example, teachers may start by asking students to read independently for 5 minutes. They can increase the time weekly until they reach their target of 20 minutes of independent reading time. **Teachers could also encourage students to keep success folders. A success folder provides a place for students to keep artifacts of successful learning and assignments or projects that give students a sense of pride** (Wilson & Conyers, 2017). When students are feeling discouraged, they can refer to the success folders to alleviate their frustrations and remind them that they can achieve success with hard work and persistence.

FAMILY PRACTICES THAT SUPPORT A GROWTH MINDSET

Recently, there has been an interest in the role of families in developing the mindset of students. Parents who see failure as helpful tend to help nurture a growth mindset in their children. Parents who see failure as harmful tend to nurture a fixed mindset in their children (Haimovitz & Dweck, 2016). Parents holding a growth mindset about ability appear to have a positive effect on their students' achievement by reducing unhelpful learning-related parental behaviors and facilitating children's adoption of a growth mindset (Matthes & Stoeger, 2018). Parents with a stronger growth mindset were involved in less homework-related conflict (e.g., homework as a cause of bickering with their child) and less controlling behavior with their students' learning (e.g., demanding their children study in response to a poor grade). A large-scale study from Denmark demonstrated that parents who believe their child's reading abilities are fixed engage with their child in unconstructive, performance-oriented ways. Relatedly, interventions focused on parents' mindset had a positive effect on students' reading abilities (Andersen & Nielsen, 2016).

Many of the recommendations provided to teachers can also be used by parents to support growth mindset thinking in their children. The most promising practices for parents include modeling growth mindset thinking,

using growth mindset language, openly discussing learning with your child, and encouraging risk-taking and learning from mistakes.

PROMISING PRACTICE 12: MODEL GROWTH MINDSET THINKING

One of the best strategies that parents can use to encourage growth mindset thinking in their children is to model growth mindset beliefs and thinking. **Often parents say things about their own abilities that suggest to their children that abilities are not malleable.** For example, when parents say things like, "I can't cook" or "I'm terrible at driving," this sends a message to their children that many abilities are innate. However, parents can model growth mindset thinking by stating an alternative, "I am going to take a cooking class so I can improve my skill" or "I need more practice and guidance at driving." Additionally, parents can model growth mindset by learning something new or working to develop a new skill (Winn, 2015).[3] Further, parents should discuss with their children the mistakes they have made and what they have learned from them. When parents convey a positive orientation about their mistakes and struggles, they show their children that mistakes are natural parts of the learning process (Mindset Works, 2017b).

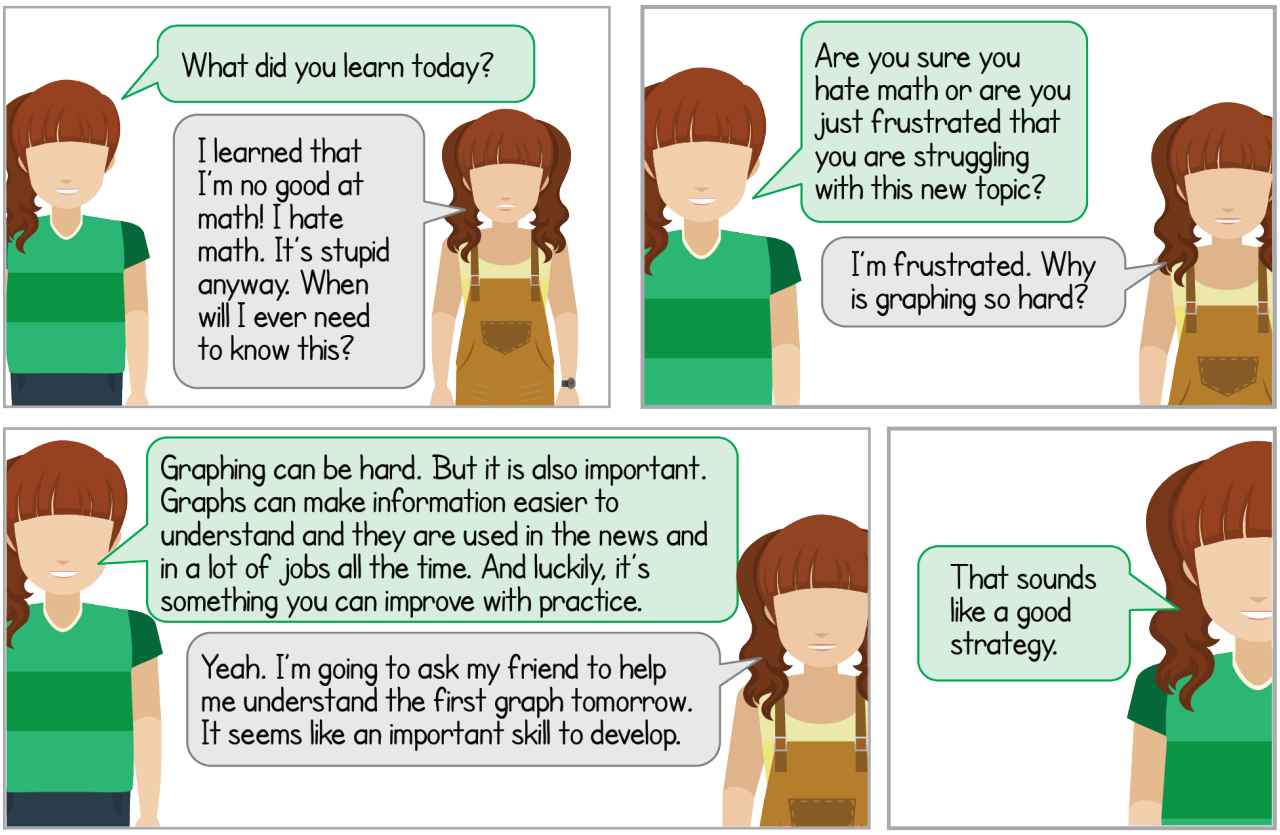
PROMISING PRACTICE 13: PRAISE FOR PROCESS

Just like teachers, parents should use growth mindset language when providing praise to their children. The way parents praise their children helps to shape their mindset. In a longitudinal study tracking parents' use of praise, young children of parents who used process-praise, rather than person-praise, were more likely to have growth mindset beliefs 4 to 6 years later (Gunderson et al., 2013). Praising children for being smart suggests that "smartness" is a trait or unchangeable quality that the child has and promotes a fixed mindset. However, when parents focus on process (e.g., "your hard work really paid off!"), this suggests to children that the effort they put in has a direct effect on their success and can foster a growth mindset (Mindset Works, 2017b). **Praising effort, hard work, persistence, rising to a challenge, learning from a mistake, and creative use of strategies are all great process-oriented praise that parents can use to encourage growth mindset thinking** (Mindset Works, 2017b; Winn 2015).

[3] Additional tips for parents can be found at https://www.oxfordlearning.com/growth-mindset-tips-for-parents/

PROMISING PRACTICE 14:
DISCUSS LEARNING WITH YOUR CHILD

Learning Context: Over dinner, a student is having conversations with his parents. He has been struggling with interpreting the graphs and drawing conclusions about the spread of the pandemic.



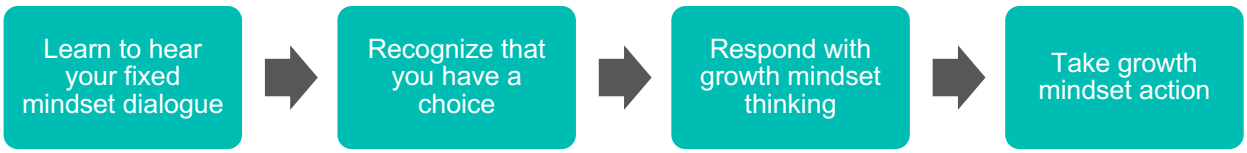
Parents can use their daily conversations with their children to talk about learning. They can ask questions like, "What did you learn today?," "What mistake did you make that taught you something?," or "What did you try hard at today?" It is important for parents to share their answers to these questions, as it helps to continue modeling growth mindset thinking (Dweck, 2006). Additionally, parents should remember that growth mindset does not have to focus solely on academics. Mindset applies to many other areas, such as athletic, music, artistic, and social ability. Parents can incorporate the same question strategies with these areas and discuss the next steps that children plan to take for improvement. Further, parents can discourage comparison and envy of peers during these conversations (Winn, 2015). When children compare themselves to others, parents can say things like, "She must have practiced a lot" or "What might you do to improve your skill in this area?" This tactic will help children to realize that their peers also have to put in effort to develop their skill.

PROMISING PRACTICE 15: ENCOURAGE RISK-TAKING AND LEARNING FROM MISTAKES

Parents should also encourage their children to take risks. It is difficult for parents to let their children try difficult tasks, struggle, and fail. However, failure teaches important life lessons and buoyancy in the face of setbacks. Success after failure teaches children the importance of effort and perseverance and fosters growth mindset beliefs. Parents can help their children by celebrating their effort and helping them to highlight the lessons they learn through failure. Further, in addition to modeling risk-taking and learning from mistakes, parents can also tell their children stories of famous people who failed but did not give up (Winn 2015).

STUDENT PRACTICES THAT SUPPORT A GROWTH MINDSET

Dweck (2006) presented a four-step process to change mindset. The key to changing mindset is self-awareness. For students to change their mindset, they must be able to identify the situations that trigger a fixed mindset—*when and under what circumstances*. They should identify what makes them feel threatened and defensive. That is, students must learn to hear their fixed mindset inner dialogue (Dweck, 2006). The fixed mindset voice is the inner critic that undermines and judges us (Jeffrey, 2020). For example, the fixed mindset may say things like, "Are you sure you can do it?," "I told you it was too risky," or "It's not my fault. I'm just not good at mathematics" (Dweck, 2006; Jeffrey, 2020**). Common fixed mindset triggers include having to work hard, facing setbacks, getting negative feedback, being challenged, and seeing success in others** (Dweck, 2006).



Once students learn what triggers their fixed mindset dialogue, students can anticipate the voice and listen for it. Then, students can learn to recognize they have a choice. When students hear their inner dialogue with fixed mindset beliefs, they can either accept them (thus, subscribing to fixed mindset thinking) or they can challenge the voice. They can view the voice as a sign that they need to challenge themselves, increase their efforts, change their strategies, and, above all, continue to develop (Dweck, 2006; Jeffrey, 2020).

Then, students can respond with growth mindset thinking. That is, students talk back to their inner critic with language that encourages a growth mindset. For example, in response to "Are you sure you can do it?," the student may respond, "I'm not sure I can do it now, but I think I can learn to with time and effort." In response to "I told you it was too risky," the student may respond, "Most successful people have failures along the way." Or, in response to "It's not my fault. I'm just not good at mathematics," the student may respond "If I don't take

responsibility, I can't fix it" (Dweck, 2006; Jeffrey, 2020). Additionally, students could journal their inner dialogue to help them identify common patterns in their thought processes (Jeffrey, 2020).

Finally, students can take growth mindset action (Dweck, 2006). The growth mindset response will provide some indication to help students identify the necessary actions that will lead to growth. They may need to accept the challenge, learn from their failures, or use criticism to make adjustments to their strategies and try again (Dweck, 2006; Jeffrey, 2020). This inner process is a metacognitive strategy that can be applied to a range of settings.

2.3. WHAT PROGRAMS HAVE BEEN EFFECTIVE AT CHANGING GROTH MINDSET?

There is no shortage of examples of interventions designed to improve growth mindset thinking. However, most of the implementation studies have been narrowly focused. The interventions typically target only one level of the education system instead of trying to address growth mindset across the education system—school leaders, teachers, parents, and students. Additionally, most programs tend to focus on growth mindset in a specific context (e.g., mathematics), which may not translate to changes in growth mindset in other contexts. Further, the duration of most programs is short (e.g., 30-minute sessions across a couple weeks) and involve teaching students, or adults, about growth mindset via a technology-enabled platform (e.g., Brainology, Class Dojo, Khan Academy). This section describes some of the most common and comprehensive growth mindset interventions in the literature.

BRAINOLOGY: A COMPUTER-BASED PROGRAM FOR GROWTH MINDSET

Program Example: Mindset Works Brainology and SchoolKit support growth mindset development of school staff and students.

One of the most common student interventions for growth mindset is the Brainology program (Mindset Works, 2017c).[4] Brainology was developed by Mindset Works, an organization associated with Carol Dweck. The program uses a blended learning curriculum that includes 2.5 hours of online instruction modules and an additional 10 hours of offline classroom activities. The program is designed to improve growth mindset by explicitly teaching students about how the brain functions and learns. The program also includes instruction on successful academic habits, study techniques, and self-regulation strategies. Students deepen their knowledge through the online modules and then reinforce and apply their knowledge to their own experiences through classroom lessons. Teachers receive an implementation guide and access to student data through the teacher dashboard. The program is designed for students in Grades 4–7 and intended to cover a range of achievement levels and educational settings (Mindset Works, 2017c).

One case study of a middle-grades school in Washington DC, conducted by Mindset Works, showed growth mindset and learning gains when the school implemented the full Mindset Works Schoolkit (Mindset Works, 2017d).[5] The Schoolkit includes the Brainology program for students, as well as Mindset Maker, an online professional development program for school leaders, teachers, and other school staff such as instructional coaches, guidance counselors, school psychologists, and tutors (Mindset Works, 2017e). The school serves Grades 6–8 and has a student body of about 423 students. Many of the students who attend this school come from low socioeconomic communities and most are from historically marginalized racial/ethnic groups (Mindset Works, 2017d).

In the first semester of Year 1, the school began training all support providers, school leaders, and teachers using the Mindset Maker professional development program. In the second semester, after training school staff, the Brainology program was implemented in all Grade 7 science classes. At the end of the year, Grade 7 increased by 417 Lexile points in reading, double that of Grade 6 and 8 students who did not receive the Brainology program (Mindset Works, 2017d).

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[4] Find out more here: https://www.mindsetworks.com/programs/brainology-for-schools

[5] Find out more about this case study here: https://www.mindsetworks.com/Science/Case-Studies

In an effort to reach more students, Brainology was offered as a 9-week elective course in Year 2. Additionally, school leadership implemented parent engagement sessions to increase awareness among parents about mindset and the language that fosters growth mindset thinking. Anecdotally, school leaders reported that students felt more empowered and willing to put in more effort. This school experienced more growth in *i-Ready* Mathematics than any other school in the district—86% compared to the 55% district average. Starting in Year 3, the Brainology program was required for all Grade 6 students (Mindset Works, 2017d).

It is important to note that not all studies on the Brainology program have shown that the program was effective. A study with secondary school geometry students found no significant gains on the California standardized test for geometry for students using the program (Antink, 2010). Wilkins (2015) also studied Brainology in five urban middle-level schools and found no statistically significant benefits of using the program. These implementations only included the Brainology program, without additional supports for school leaders and teachers. **This issue further highlights the complex nature of growth mindset and necessity of addressing mindset at a systems-level to ensure alignment and common messaging to ensure lasting improvements in growth mindset.**

CHANGING MINDSETS: A UNITED KINGDOM PILOT STUDY

Program Example:
The Changing Mindsets program in the UK focuses on both teachers and students and demonstrated modest gains in student academic performance.

The Changing Mindsets project was funded by the Education Endowment Foundation, sponsored by the National Institute of Economic and Social Research, and led by the University of Portsmouth. The program was implemented between January and May 2013 and targeted Year 5 teachers and students in Portsmouth, Southampton, and Hampshire in the United Kingdom. The study included 30 schools and 1,505 students. To study the effects of the program, schools were randomly selected for participation in the interventions. Thus, 15 schools with 628 student participants received the intervention and 15 schools of 877 student participants did not receive the intervention. The program included two primary interventions. The first intervention was a six-week mentoring program with workshops designed to teach students directly about the malleability of intelligence. The second intervention was two half-day professional development sessions that trained teachers on approaches to developing and reinforcing a growth mindset in their teaching. The project was designed to improve academic achievement by supporting students to develop growth mindset thinking (Rienzo, Rolfe, & Wilkinson, 2015).

Students who received the growth mindset intervention reported higher growth mindset scores than students who did not receive the intervention. Additionally, students who received the growth mindset intervention made an average of two additional months' progress in English and mathematics, compared to the students who did not receive the intervention. Although the results were not statistically significant, two months of

learning may be viewed, by some, as a practically meaningful increase. Teacher growth mindset professional development did not appear to affect student achievement. It is important to note that all schools included in the study were already using some aspects of the growth mindset approach. This may have weakened the impact of the intervention. Further, researchers also noted that the intervention was relatively short, with only six sessions for students and two half-day training sessions for teachers. **The length of the sessions may need to be extended to see a significant effect on student performance** (Rienzo, Rolfe, & Wilkinson, 2015).

WORLD BANK'S GROWTH MINDSET PROGRAM: A SOUTH AFRICAN IMPLEMENTATION

Program Example: Online growth mindset training for South African students improved attitudes toward learning and academic performance.

Building on growth mindset interventions developed for students in Peru and Indonesia, the World Bank's Mind, Behavior, and Development Unit (eMBeD) partnered with the Western Cape Government, the University of California Davis, and Class Dojo to develop a growth mindset intervention for implementation in South Africa (World Bank, 2018). The study included 12 primary schools and 8 secondary schools, representing 558 Grade 4 and 5 students and 578 Grade 8 and 9 students. To study the effects of the program, schools were randomly selected to participate in the intervention, and students of the selected schools received the growth mindset program. The program consisted of five 30-minute growth mindset sessions. In the first three sessions, students watched five three-minute videos, created by Class Dojo, that featured two friendly cartoon monsters who modeled growth mindset thinking in their journey of learning. After each video, students participated in reflection questions, either written individual or as part of a group discussion. Students also completed activities designed to reinforce growth mindset thinking in the months following the sessions (World Bank, 2018).

Among secondary school students, the growth mindset intervention resulted in an improvement in student attitudes towards learning and student academic performance. Secondary school students who received the growth mindset intervention scored an average of 46% on the mathematics assessment, compared to an average of 39% for students who did not receive the growth mindset intervention. The study did not find an effect of the growth mindset intervention on test scores or grades for primary school students (World Bank, 2018). There were a number of barriers that affected the implementation of the growth mindset intervention. First, there were disruptions due to the social unrest in South Africa. Second, there were inconsistencies in student and staff attendance, as well as inconsistencies in how the program was implemented across schools. Third, teachers were not included in the intervention. Including teachers may have improved the effectiveness of the intervention (World Bank, 2018**). Nevertheless, the results of the South African intervention, coupled with the project in Peru and Indonesia, suggest that technology-enabled growth mindset interventions**

directed at students can improve short-term outcomes. Additional research is needed to determine the long-term effects of such programs.

DENMARK'S READING INTERVENTION: A PARENT GROWTH MINDSET INTERVENTION

Program Example: A parent growth mindset intervention in Denmark improved student reading abilities, particularly among students whose parents had held fixed mindsets.

Building on the laboratory experiments that have shown parents mindsets influence how they interact with their children, researchers in Denmark implemented a reading intervention for children that also included parent training on growth mindset beliefs and thinking. The study included 72 classrooms with 1,587 second-grade children in Denmark. To study the effects of the program, classrooms were rank-ordered based on average child language skills and divided into groups of four classrooms. In each group, two classrooms were randomly assigned to participate in the intervention and the other two classrooms served as a comparison group. Parents who received the intervention were provided a booklet and access to online videos with three core components: 1) emphasizing growth mindset and explaining to the parents that their child's reading ability can be improved; 2) encouraging parents to talk to the child about the reading and make sure that it was an enjoyable experience, and 3) encouraging parents to praise their child's effort rather than performance (Andersen & Nielsen, 2016).

Overall, the intervention improved reading in three domains: language comprehension, decoding, and text comprehension. More importantly, the results showed the intervention was more effective for children whose parents had higher fixed mindset beliefs prior to the intervention. Specifically, reading abilities of children whose parents held a fixed mindset at baseline increased 2.5 times more than the reading abilities of children whose parents held a growth mindset at baseline, equivalent to an additional 2.4-month progression in reading (Andersen & Nielsen, 2016).

2.4. SUMMARY OF PRACTICES AND PROGRAMS

Although growth mindset initiatives can show immediate results in the short-term, their effects may not have a lasting impact. This problem should not be surprising, given the complex nature of growth mindset beliefs and thinking and the competing sources of information that shape students' mindset beliefs. Experts in mindset theory and application (Dweck, 2018) believe it is unrealistic to expect a single growth mindset intervention to result in enormous shifts in student beliefs about their intelligence or their academic achievement, especially if nothing else changes in the school and classroom environment. However, consistent and comprehensive efforts across the community of support could result in substantial, long-term benefits and sustained effects over time.

PART 3.
RECOMMENDATIONS FOR IB STAKEHOLDERS

Even with mixed research findings, growth mindset has been widely accepted by educators, incorporated in educational policies, and implemented emphatically in classrooms across the world with students of all ages. Although future research is needed on the effects of systematic growth mindset interventions, there appears to be some evidence that, when implemented correctly, growth mindset interventions can have meaningful impacts on teachers, parents, and students. Further, it is important to reiterate that growth mindset can be somewhat controversial. The recommendations provided here, while directed at improving growth mindset, are the same recommendations for improving similar skills (e.g., self-efficacy, attribution, goal orientation, locus of control) and are generally considered best practices in education. This section presents recommendations for IB stakeholders, including educators (school leader and teachers), parents, and students interested in integrating growth mindset thinking and beliefs in their personal and professional lives.

3.1. RECOMMENDATIONS FOR THE IB ORGANISATION

The IB has a number of supports in place for facilitating growth mindset in school leaders, teachers, and students. Key practices are well represented in IB's Programme Standards and Practices, Approaches to Learning, and IB Learner Profile. As a result of this research review, there are a few recommendations that IB could implement to strengthen and reinforce growth mindset beliefs and thinking into programme curricula. Again, whether IB chooses to frame these strategies and practices as growth mindset or more broadly as promising practices for social and emotional learning, they are promising practices that can have a positive impact on the classroom environment, student attitudes and confidence, and student achievement.

RECOMMENDATION 1: CONSIDER EXPLICITLY INCORPORATING GROWTH MINDSET BELIEFS AND THINKING IN IB'S APPROACHES TO LEARNING

The IB Learner Profile includes key attributes of growth mindset thinking. Additionally, IB's Programme Standards and Practices include many characteristics of the policies, practices, and programs that have been shown to be successful at improving growth mindset thinking. IB stakeholders could benefit from including growth mindset as an explicit self-management skill in Approaches to Learning and, therefore, become a targeted skill for both students and teachers to learn about and practice.

RECOMMENDATION 2:
CONSIDER DIRECTLY EMBEDDING GROWTH MINDSET MODELING AND MESSAGING INTO IB PROGRAMME RESOURCES

The modeling and messaging students receive are extremely important for shaping their views of intelligence and ability. The IB could consider embedding activities and language in programme curricula that support growth mindset thinking. For instance, IB could provide teachers with explicit sample lessons about identifying fixed mindset triggers and encourage teachers to have students write growth mindset responses to common fixed mindset inner dialogue. IB could also build age-appropriate content about the neuroscience of brain development in learning into the curriculum across grade levels. The IB could also provide teachers with professional development to create activities that focus on the learning process as opposed to the final product. In later grades, this approach could produce a portfolio of students' learning process to examine and include in summative evaluation, rather than focusing entirely on the final draft or presentation of work. IB could develop a rubric for evaluating stages of the learning process and markers of improvement that teachers could use to provide formative feedback to students.

RECOMMENDATION 3:
PROVIDE GUIDANCE FOR SCHOOLS TO DEVELOP A SCHOOL CULTURE THAT SUPPORTS GROWTH MINDSET BELIEFS AND THINKING

The IB has indirectly shaped school culture through the Standards and Practices requirements for all programmes. IB could consider providing additional guidance, either as part of the Standards and Practices, or as an optional set of guidelines for establishing a growth mindset culture. Many of the practices that foster a growth mindset culture are the same practices that facilitate safe, supportive, and successful learning environments for adults, youth, and children. IB could make those practices more explicit and provide additional information to school leaders on how to best shape their school culture.

RECOMMENDATION 4:
PROVIDE A COMPENDIUM OF GROWTH MINDSET PROFESSIONAL LEARNING OPPORTUNITIES AND RESOURCES FOR SCHOOL LEADERS AND TEACHERS

Using this policy paper as a starting point, the IB could consider offering professional learning opportunities focused on components designed to develop growth mindset for school leaders and teachers. This approach could include raising awareness of growth mindset, the importance of modeling and messaging, and explicitly teaching about the brain. The IB may also consider creating a compendium of resources for school leaders and teachers to access as they ingrain growth mindset beliefs and thinking into their school culture. Alternatively, IB could provide a platform for teachers to share growth mindset resources. Indeed, according to blog entries

published online by IB teachers, many IB teachers already incorporate growth mindset thinking strategies into their classrooms.[6]

RECOMMENDATION 5: CONSIDER PROVIDING RESOURCES FOR PARENTS

Given that parents also influence their students' mindset through modeling and messaging about ability, IB should consider developing resources or workshops for parents that raise awareness about the benefits of growth mindset beliefs and thinking and effective parenting strategies to foster and reinforce those beliefs in students. This alignment between the home and school will likely increase the effectiveness of school-based efforts.

3.2. RECOMMENDATIONS FOR IB SCHOOL LEADERS AND TEACHERS

School leaders and teachers are at the heart of facilitating growth mindset thinking in their students. In many instances, school leaders and teacher may already be engaged in activities that support growth mindset thinking. As such, these recommendations are intended to help school leaders and teachers refine and strengthen their existing processes and practices, as well as introduce some new processes and practices that school leaders and teachers may consider to more explicitly address growth mindset. Further, while these recommendations are framed specific to growth mindset, it is worth noting that these recommendations also align with best practices in education. Thus, they may be relevant for critics and skeptics of growth mindset theory.

RECOMMENDATION 6: CONSIDER CULTURAL NORMS AND EXPECTATIONS PRIOR TO IMPLEMENTING A GROWTH MINDSET INITIATIVE

As noted previously, growth mindset has largely developed through research with Western cultures. As such, the policies, practices, and programs reviewed in their policy brief are heavily influenced by Western culture and may not be received in the same way when implemented with other cultures. It is important for school leaders

[6] See examples here: https://blogs.ibo.org/blog/2017/06/29/the-growth-mindset-in-action/

https://www.pypteachingtools.com/tag/growth-mindset/

and teachers to consider their specific cultural norms and expectations and inquire within their schools whether adaptations are needed for policies, practices, and programs to be successful in their context.

RECOMMENDATION 7: CONSIDER A SYSTEMS APPROACH FOR GROWTH MINDSET INITIATIVES

Given the number of mindset-related messages students receive from the people in their lives (e.g., school leaders, teachers, parents, peers, social media communities), it is important that any initiative directed at improving students' growth mindset thinking uses a systems-level approach. Initiatives should include some intervention for school leaders, teachers, parents, and students. This will help to ensure that there is alignment across the messages that students receive and that the messages support a malleable view of general intelligence and ability across disciplines. Further, school leaders and teachers should consider how policies, such as grading and assessment, facilitate or hinder growth mindset thinking.

RECOMMENDATION 8: BUILD A SCHOOL CULTURE AND CLASSROOM ENVIRONMENT THAT SUPPORTS GROWTH MINDSET THINKING

School leaders and teachers should create a culture and classroom environment that supports growth mindset thinking. Teachers and students need to feel comfortable taking risks, trying new things, and overcoming the challenges they experience (Dweck, 2006). Fortunately, the key characteristics that support growth mindset thinking and beliefs are common for any supportive school culture. Thus, it is likely that these features already exist, even though they have not been explicitly linked to growth mindset. Further, teachers can establish growth mindset norms in their specific classrooms through setting high expectations for all students and structuring learning tasks to support growth mindset.

RECOMMENDATION 9: MODEL GROWTH MINDSET BEHAVIOR AND LANGUAGE

School leaders and teachers should model the growth mindset behaviors and language they want to see in students. They can discuss their own mindset thinking, talk about their thought processes, provide formative feedback, provide adequate time for reflection, and implement process-oriented praise. A key strategy is to embrace the word "yet." School leaders and teachers can post growth mindset language throughout the school (e.g., posters, bulletin boards, motivation quotes) and encourage students to restate fixed mindset comments using growth mindset language.

RECOMMENDATION 10: CONSIDER EXPLICITLY TEACHING STUDENTS ABOUT THE BRAIN

School leaders and teachers considering growth mindset interventions should consider explicitly teaching about brain plasticity. Nearly all growth mindset interventions include some instruction around the brain. Dweck (2006) suggests that explicitly teaching about the brain can be accomplished through mindset lectures that focus on how the brain forms connection and how thought patterns facilitate growth mindset beliefs. A great deal of material has already been developed and could be implemented with students through technology-enabled lessons.

3.3. RECOMMENDATIONS FOR IB PARENTS

Parents establish the foundations for student mindsets. Thus, it is important for parents to foster growth mindset thinking in their children from a young age. Many of the recommendations provided to teachers can also be used by parents to support growth mindset thinking in their children. However, it is important to note that parent-children interactions vary considerably within and between cultures. The following recommendations are not meant to advocate for any specific parenting technique. They are meant to provide parents ideas for strategies they may wish to try with their children. Parents should consider whether these approaches align with their specific parenting styles and whether these strategies would work with their individual child's personality.

RECOMMENDATION 11: MODEL GROWTH MINDSET BEHAVIOR AND LANGUAGE

Similar to school leaders and teachers, parents should model the growth mindset behaviors and language they want to see in their children. Parents can use their daily conversations with their children to talk about learning. Parents can model growth mindset thinking by being intentional about the language they use when talking about their own abilities. They can also model growth mindset by learning something new or working to develop a new skill (Winn, 2015). Further, parents should use growth mindset language when providing praise to children by praising effort, hard work, persistence, rising to a challenge, learning from a mistake, and creative use of strategies (Mindset Works, 2017b; Winn 2015).

3.4. RECOMMENDATIONS FOR IB STUDENTS

Even though there are many external factors that influence students' mindset, ultimately, students are responsible for the mindsets they hold, and no amount of external stimuli will shift students' mindset beliefs and thinking without their active participation.

RECOMMENDATION 12: IDENTIFY FIXED MINDSET TRIGGERS AND RESPOND WITH GROWTH MINDSET THINKING AND ACTIONS

Although students receive messages about their abilities from others, students are ultimately responsible for which messages they accept and for changing their thought processes. The key to changing mindset is self-awareness. For students to change their mindset, they must be able to identify the situations that trigger a fixed mindset—*when and under what circumstances*. When students hear their inner dialogue with fixed mindset beliefs, they can either accept them (thus, subscribing to fixed mindset thinking) or they can challenge the voice, by responding with growth mindset thinking. With that thinking in place, students can take growth mindset action (Dweck, 2006).

3.5. CONCLUSION

Ultimately, with any recommendation that the IB decides to enact, the expected results should be considered in light of the various sources through which students' mindsets develop and change. It is important that there is alignment across the messages that students receive and that the messages support a malleable view of general intelligence and ability across disciplines. Because of the complex nature of how perceptions are formed, shaping mindsets requires a systems-level approach that includes school leaders, teachers, students, and parents to ensure lasting improvements in mindset. The IB is well situated to leverage its existing social and emotional learning expertise, along with rigorous curricula, to elevate growth mindset thinking across the educational system.

ACKNOWLEDGEMENTS

We want to thank several people who contributed to the content and design of this policy paper. First, we want to thank Dr. Magdalena Balica of IB for providing our research team with constant support throughout the entirety of the project and for suggesting several avenues of research that helped improve the quality of this policy paper. Second, we want to thank the IB staff who read an earlier draft of this manuscript and provided insightful and useful feedback that undoubtedly made the overall policy paper stronger. Finally, we want to thank Curt Sell of Inflexion for lending us his patience and expertise in graphic design.

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APPENDIX: A NOTE ON METHODOLOGY

The purpose of this policy paper is to provide a brief, broad overview of growth mindset in primary and secondary education; present promising policies, programs, and practices; and to recommend ways for IB stakeholders to improve students' growth mindset thinking and beliefs. As such, our literature review was not designed to be fully systematic in nature or to be the definitive account of any of the individual topics addressed in the policy paper. Our goal was to provide a high-level overview of the field, with a focus on providing practical insights and practices that a variety of IB stakeholders can begin implementing in their daily work educating children.

For this purpose, we conducted a mixed methods literature review to collect research from academic databases and popular, practitioner-oriented sources (e.g., journals, magazines, websites; Grant & Booth, 2009). We began our literature review process by generating an initial definition of growth mindset. We then employed that definition to develop search terms and parameters for searches in two academic databases: PsychNet and ProQuest's Education Collection. We employed nine search terms: (a) growth mind*, (b) growth mind* AND learn*, (c) fixed mindset, (d) changing mindset, (e) entity theory, (f) incremental theory, (g) Dweck, (h) development orientation, and (i) growth thinking. We limited our search for articles from 2000-2020 to keep our search manageable and also to focus on the most recent and relevant literature.

The initial search produced 463 unique articles. From that initial pool, we excluded articles that were not grounded in primary or secondary education, studies that were completed in clinical settings, and those focused too narrowly on specific academic subjects or topics. That resulted in a secondary pool of 129 inclusions. From that pool, we further narrowed down to a core group of 37 articles that served as the starting point for framing the paper. We selected this core group of articles to ensure adequate coverage of the pre-determined paper sections created in collaboration with our IB Research Manager.

The remaining articles used in this review come from three sources: (a) references connected to the initial pool of 37 articles; (b) additional, targeted searches to reach full coverage across the different paper sections; and (c) article recommendations from our IB Research Manager and the initial resources selected by IB as necessary context for the policy papers project. First, we used a targeted snowball method (Wohlin, 2014) to identify relevant literature connected to the core pool of 37 articles. We looked backward by examining the original article's reference section, as well as forward by using GoogleScholar to identify what new articles cited the original article. This allowed us to identify important seminal articles, which is why some articles cited in the policy paper were published before 2000. Second, we conducted an extensive search on the Mindset Scholars Network. This site included a repository of research on growth mindset that was not obtained through the database search. Third, we conducted targeted searches to fill gaps not covered by the core literature pool. For

example, our initial search did not produce any policies, practice, or program in Africa. Therefore, a separate, targeted search in the aforementioned databases and on GoogleScholar was used to identify the most relevant literature. Finally, we reviewed relevant articles recommended for inclusion by our IB Research Manager, those that served as the impetus for the policy paper project, and those that provided necessary context on IB programmes. These articles were instrumental in framing the recommendations for IB stakeholders.

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