

Becoming a Reader: What We Know and What We Need to Know about Literacy and Reading Self-Efficacy among Black, Brown, and Indigenous Low-SES Youth

Core Work Team:

Mary Helen Immordino-Yang and Rebecca Gottlieb with Emily Gonzalez, Saara Mahjouri, Gina Nadaya, Ellyn Peuschel, Laura Rhinehart, Xiao-Fei Yang; University of Southern California, The Center for Affective Neuroscience, Development, Learning and Education (CANDLE)

Advisors:

Joanna Christodoulou, Tracy Fray-Oliver, Nadine Gaab, Jeffrey Garrett, Taneda Hailey, Fumiko Hoefft, Claudia Koocheck, Suzanne Nguyen, Veronica Pedroza, Rodrigo Miranda Riveros, Mary Shimazaki, Winsome Villiers, Erin Whalen, Daniel Willingham, Maryanne Wolf

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America is in the throes of a multi-pronged literacy crisis. About 2 out of every 3 students have insufficient reading skills for their grade level, and emerging cultural trends threaten to erode deep reading capacities further. The proportion of students struggling to read is much greater among students of color and those experiencing poverty. Indeed, the effects of poverty and racial trauma is evident in reading-relevant brain areas (Noble et al., 2007). These pernicious inequities are no coincidence; “No other developed nation has inequities nearly as deep or systemic. [...] Sadly, what feels so very un-American turns out to be distinctly American” (U.S. Department of Education, 2013). Addressing this crisis requires dramatic effort and new approaches.

Commissioned by Reading Reimagined and the Advanced Education Research and Development Fund (AERDF), we seek to help inform an evidence-based approach to addressing these literacy crises. We surveyed the research and educational practices at the intersection of literacy development and social emotional learning—with a focus on self-efficacy—especially as they apply to youth of color and youth living in poverty. We used a human developmental lens to study the dynamic, situated, and interdependent biopsychosocial changes that are literacy-relevant, experience-dependent, and that evolve across the first decades of life. As both our scientist and expert educator advisory board members urged, we focus on literacy broadly construed—i.e., the ability to navigate the world of print, images, and media in order to glean, organize, and store information, express one’s experiences, and advocate for oneself and community in the realm of print and supplementary media. The document reveals how literacy is critically important for one’s ability to contribute to democratic society and is predicated

upon—but extends far beyond—decoding written words. We understand reading development as the long-term process by which individuals build, with instruction, capacities to decode and express ideas and information through print, following the conventions of a given language. In this case we focus on English while also acknowledging the vast linguistic diversity of youth in the U.S. and the ways in which that diversity contributes to their literacy development.

This exploration of the intersection of literacy development and social emotional learning is premised on the idea that though social-emotional learning (SEL) is often conceptualized as separate from “cognitive” learning, including literacy instruction. In actuality, both social-emotional and academic learning are deeply cognitive *and* affective, reflecting the meaning-making and skills that a person develops in social and academic domains (Immordino-Yang, 2015). As we and others have shown, in the brain, social, emotional, and cognitive processing are inextricably intertwined in the acquisition and enactment of skills and knowledge, across domains (Gotlieb, Yang & Immordino-Yang, 2021). Integrating attention to developing social-emotional, cognitive, and linguistic capacities throughout educational contexts and activities is critical for supporting and engaging literacy skills and reading development for diverse populations. Additionally, it is fundamental for personhood, civic engagement, and relationship building in the modern world.

One key social-emotional capacity for literacy and reading development is self-efficacy. Self-efficacy has traditionally been conceptualized as individuals’ beliefs about their competence in a specific activity/domain or their reflections on the question, “how well can I do X?” Traditional conceptions of self-efficacy are distinct from people’s understanding of who they are (self-concept) and from their global sense of how good they are (self-esteem). They have been related to goal setting, effort, persistence, learning, and achievement. Self-efficacy is shaped by previous experiences, personal and societal messages pertaining to one’s competence, and examples of others’ success. Here we conceptualize self-efficacy through a social-justice lens and understand it as pertaining to the meaning individuals make about the possibilities for themselves and their future, their strengths, and their competencies in navigating the many dimensions of their lived experience. As was strongly seconded by a range of expert educators on our advisory board, such extensions of the self-efficacy concept can be useful for understanding the assets diverse youth bring to imagining and enacting their possible futures. Students’ beliefs about their potential as readers and learners begin to form early in schooling and can have profound effects. As such, attending to readers’ self-efficacy in coordination with their growing skills is important.

Here we offer eight sequenced learnings from our collaborative work and review of the literature, implications of these learnings for the type of research that we believe is needed and should be funded in the coming years, and action-oriented insights for activities that can contribute to closing the literacy gap.

SECTION I. Process

To conduct the landscape analysis that allowed us to arrive at these learnings, we first identified and recruited a team of community and academic experts. We worked with this team and a

broader advisory board to clarify the vision of the project and nature of the need. The team then set to reviewing bodies of literature pertaining to several key, interrelated topics and their intersectional evidence, focusing on what is known about students of color, students experiencing poverty, and students with disabilities (especially learning and reading disabilities). Specifically, we first looked at literacy within the individual, considering various capacities, assets, and developmental profiles. We considered human developmental challenges and opportunities from birth to early adulthood that have implications for reading development and literacy. We focused in particular on the role of identity in reading development for diverse youth. In addition, we also examined the reciprocal relationship between socio-cognitive capacities or tendencies (e.g., self-efficacy) and reading proficiency. We examined the roles of individual variability, neurodiversity, specific learning disabilities, and dyslexia in social and cognitive development, as well as implications for reading development and literacy.

Then, we took a wider lens to contextualize the reader in the broad context of the society they navigate. Here we worked to understand what is known in communities and scientific literature about the roles of culture, culturally responsive educational practices, racism and social-emotional experiences, interpretations, and relationships in reading development, literacy, reader identity, and self-efficacy. We examined practices informed by the science of reading that support literacy development and ways to support implementation of these practices by practitioners. Critically, we considered the timely question of the development of reading and literacy in the context of broader realities (e.g., COVID-19), modern cultural trends (e.g., related to digital technologies), social justice priorities, and structural inequities.

We identified themes, gaps, and opportunities in the available literature as well as bright spots worthy of replication and further study—especially with more diverse samples and with recognition of the complexity of real-world learning settings. We have incorporated extensive feedback from focus groups and interview sessions with advisory board members on these learnings and have been guided by the work of the board throughout the process. *A strong theme that emerged across advisory board members is the breadth of knowledge that exists about both beneficial literacy practices and social-emotionally supportive environments as well as the simultaneous dearth of knowledge about integrating these two.*

Our eight Learnings inform, in an integrative way, our recommendations for the types of research questions and partnerships we propose can contribute to closing the literacy gap. Recommendations are woven in at the conclusion of select Learnings. Research that will help reverse the trend of the American reading crisis will need to encourage investigation from multiple perspectives, use varied methods, and draw on diverse experiences and expertise. Strong research questions are practically and theoretically motivated, explicit about bias and values, and discovery- and process-oriented (rather than simply documenting causal “effects” or monolithic “outcomes”). Strong questions foreground diversity and equity, while also generating scientific insights and understanding with ecological validity. Strong questions speak to underlying causes and mechanisms, rather than simply describing change or impact. They are premised on the inherently integrative nature of relevant social-emotional and cognitive skills, honor the subjective experiences, knowledge, and cultural assets of the individuals and communities involved, and recognize that insights generated must always be interpreted and

applied with a mind to contextual and cultural affordances. We attempt to offer such questions here.

We believe, together with the advisory committee members, that enriching our understanding by pursuing these questions will help reverse the trend of the American reading crisis while prioritizing students, families, and teachers in developing scalable solutions to reduce inequities in reading instruction and literacy outcomes.

SECTION II. Learnings, their Evidence Base, and Aligned Questions for Future Work

1. Supporting reading development and closing the literacy gap are important not only because of the value of being a reader, but also, and perhaps more importantly, because reading paves the way for young people to explore curiosities, develop into critical thinkers, and engage in perspective taking, which strengthens our families, communities and democracy and moves us towards a more equitable society.

“So let us wage a global struggle against illiteracy, poverty and terrorism and let us pick up our books and pens. They are our most powerful weapons.”

~ Malala Yousafzai, Address to the United Nations Youth Assembly, 2013

To understand why we must pursue the goal of supporting students’ literacy development and closing reading gaps in the U.S., we consider two fundamental questions. First, what is the purpose of literacy in America? We believe that literacy competence is a public good. Our democracy benefits from being composed of a diverse electorate with refined critical analytic and perspective-taking skills honed through literacy (Wolf, 2018). Our economy benefits from drawing on disciplined and creative minds to spur innovation and facilitate communication. Our society also benefits from its members seeking to develop the moral, ethical, and emotional aspects of a life of purpose, and how better to do so than by allowing ourselves to be changed and inspired by reading deeply the stories of our real and fictional heroes (Wolf, 2018)? Our communities benefit from being composed of people empowered by literacy proficiency to access knowledge, develop intellectual agency, and productively contribute. Our families benefit from the joy of individuals reaping the personal pleasures of getting lost in a book or newspaper (Willingham, 2015). As all of these examples show, literacy is among the most fundamental modern cultural skills for deep learning and engagement. The extent to which our democracy, economy, and society realizes the benefits of public literacy instruction is determined by the extent to which *all* its members are able to receive high quality public instruction responsive to their needs, especially in reading. Inequities in literacy instruction plant a venomous seed that gives rise to additional, caustic inequities in society (e.g., in our justice system, as advisory board member Erin Whalen clearly pointed out). The development of reading practices can be a step towards ameliorating these. Indeed, non-profit organizations such as the [J3 Foundation](#) and the inspiring advocacy work of reformers like [Shaka Senghor](#) (2016) understand the link between illiteracy and other ills and premise their fight for literacy—especially for underserved youth—on the idea that literacy is a way of stemming justice-system involvement, which disproportionality hurts men of color. America’s public schools—our best hope for inspiring young people to create

change in the world—must provide all youth with the gift of literacy as a tool to unlock their potential.

The second fundamental question we consider is: how can culturally responsive and developmentally appropriate literacy instruction contribute to preserving individuals' dignity and to protecting individuals from harm? In a culture and society so filled with and dependent on language, and as our economy increasingly requires knowledge-based work rather than manual labor, literacy has become a fundamental human right. It is a foundation from which individuals come to understand and interact with their world throughout their life and even grow their intelligence (Ritchie, Bates, & Plomin, 2015). Aside from productivity and information access, it is associated with the development of interpersonal skills (e.g., empathy and perspective-taking) across the lifespan that are key for navigating human relationships (Batini et al., 2021; Dodell-Feder & Tamir, 2018; LaRusso et al., 2016; Sparapani et al., 2018). As advisory board members Mary Shimazaki and Tracy Fray-Oliver emphasized to us, reading is a fundamental skill that opens doors to learning across disciplines and domains. As Erin Whalen and Jeffrey Garrett added, literacy has the potential to help young people understand their world and create the future they desire; without strong literacy skills, many basic life choices are inaccessible.

Schools that encourage varied opportunities for students to grow and interact with materials, ideas, and people harness the power of literacy—and thereby serve the public good and promote basic human rights. An example of high quality, equitable literacy instruction in practice can be found in the [Bank Street School for children](#), which utilizes the developmental-interaction approach. Children leverage their developing literacy to learn how to understand themselves more deeply and to make meaning of the world around them. While children engage with reading, writing, and speaking in different ways, activities are designed to strategically support these capacities converging into a literacy toolkit. [Lucy Sprague Mitchell](#), founder of Bank Street College of Education, notes, “we see in education the opportunity to build a better society.” Supporting literacy development is among the most critical ways in which education achieves this aim.

2. There is a strong evidence base for how students learn to read, how to teach literacy skills, and what constitutes a productive social-emotional learning environment. Yet, the research community *has not comprehensively integrated longitudinal investigation of literacy development with investigation of social-emotional growth in order to reveal and support the assets students of color and students living in poverty bring*. We can better understand and close the literacy gap when we consider that students' social-emotional needs and cultural funds of knowledge may be critical assets to reading self-efficacy, but among low-SES students and students of color these are generally under-supported and not well understood.

a. The evidence base for how to teach reading

There is a strong evidence base for how students learn to read and how to most effectively teach literacy skills (National Reading Panel, 2000; Lyon, 1998). Indeed, there is a robust “Science of Reading” that includes generative insights from the neuroscience of reading (e.g., Christodoulou,

et al., 2014; Dehaene, 2009; See Learning 5). Research has shown, for example, that literacy skills begin developing in infancy and that the best way to teach beginning reading is through explicit phonics instruction (e.g., Ehri et al., 2001; Wolf et al., 2009). For struggling readers, including those who are students of color or experiencing low-SES, multicomponent reading interventions that have explicit phonics instruction help (Morris et al., 2012). We know early intervention and identification of at-risk readers is imperative, and that instruction on comprehension strategies and foundational vocabulary is impactful (Petscher et al., 2020).

b. The evidence base for and practical examples of productive integration of social-emotional learning into literacy instruction

Although links between literacy instruction and social-emotional learning are not yet robustly enough understood, especially for underprivileged youth of color, the literature does contain great insights into the social-emotional, cultural, and relational nature of high-quality instruction. A century of learning theory makes clear that supporting learning requires attending to a child's identity, cognitive, and social-emotional development, and recognizing the role of the cultural, social, and physiological experiences in their lives (Gotlieb et al., 2022; Nasir et al., 2021; Vygotsky, 1934). Numerous studies have examined school-based social and emotional learning programs' effects on academics (Corcoran et al., 2018). Some research has attempted to explore the possible additive effects of simultaneous social-emotional and reading interventions for struggling readers and has not found effects (Wanzek et al., 2020), but given the strong theoretical reasons to believe that there are benefits to supporting students' beliefs about their potential and given the complex interaction of reading skill and social-emotional experience, more work that holistically integrates these two is needed.

Most pressingly, research is needed to continue to elucidate effective culturally responsive and social-emotionally engaged teaching practices that support literacy development in our target groups. We can diversify our vision of deep learning to make literacy practices more inclusive when we consider that “in every religious and ethnic community there is some tradition through which people learn deeply,” and when we incorporate these practices into instruction (Mehta, 2018). Culturally sensitive literacy instruction centered on an individual's identity fosters reading identity development and motivates students, especially marginalized students, to become more effective and efficacious readers (e.g., Blanchett, Klingner & Harry, 2009; Craig & Washington, 2006; Hall, 2012). Such practices have been shown to be effective for students of color, and to be more effective than sorting students based on ability groupings. Feeling connected to one's racial-ethnic identity and having school peers of the same race/ethnicity, especially in the context of a diverse student body, can lead to improved education outcomes (Altschul, Oyserman & Bybee, 2006; Benner & Crosnoe, 2011). The use of multicultural literature, counter-narratives, or books with high socio-emotional contents to enhance empathy and reduce prejudice and intercultural conflicts can be an effective tool. Informed by Culturally Responsive Teaching (CRT), instruction can embrace children's identities, encouraging the use of literacy as a window and mirror to their historical experiences and identities (Vavrus, 2008). When students can see themselves represented in their instruction and literature, they begin to see themselves as able to engage and make a meaningful impact. This sense of belonging in a learning environment can lead to immediate and long-term positive consequences for their

academic performance and well-being (Quay, 2017). Attending to students' cultural, linguistic, ethnic, and racial identities is of particular importance for both teacher-student interactions and educational program design.

Schools that take a “whole child” approach to education, that is, that support children in their social-emotional, identity-related, and overall well-being, can more effectively support the interdependent development of literacy-, social-emotional, and identity skills. Although culturally and social-emotionally-sensitive teaching practices and school cultures are not common enough, there are many examples of schools that employ these practices to great effect. [New Village Girls Academy](#) is a school in Central Los Angeles that works to support young women from diverse and difficult backgrounds by fully embracing and supporting them and affirming their life experiences. In particular, the school emphasizes both physical and psychological wellness, and believes in asset-based approaches to education so that students can follow their interests to succeed academically. The Alaskan [Association of Interior Native Educators](#) (AINE) is another example of an organization, led by community educators, that supports identity development and affirms the cultural assets of individuals from minoritized and historically marginalized communities to support literacy among their students. AINE seeks to share their pedagogical expertise and Native Alaskan knowledge by providing engaging educational experiences that strengthen the intellectual and academic abilities of all students, but particularly those from Native Alaskan ethnic communities. For example, AINE designed a literacy curriculum that foregrounds Native Alaskan practices around oral storytelling to first inspire a love of words, an understanding of their power, and a respect for narratives rooted in many students' home culture, and then transitions students to exploring stories in written form. Programs such as these welcome learners' identities into instruction, improving content-specific development by making it meaningful and relevant to students' lives. They also draw in community members so that supporting young people's development is a community responsibility and the purpose of education becomes clearer to students. The Honoring Children, Mending the Circle program draws on American Indian and Alaskan Native practices, in concert with cognitive behavioral therapy, to help address the substantial trauma needs of students from these communities in a way that is authentic to their traditions (BigFoot & Schmidt, 2010). This approach addresses the detrimental effects of trauma on reading skill (Duplechain et al., 2008).

The home literacy environment also profoundly shapes students' developing reading skills and the development of the reading brain (Hutton et al., 2020). Caregivers play a critical role by offering supportive home literacy environments and cultivating a culture of positive literacy engagement (e.g., Aikens & Barbarin, 2008; Hill et al., 2018; See Learning 4). Practices such as reading to children every day in active and engaging ways can positively impact literacy development and social-emotional development in tandem. As such, educating parents around the importance of reading together and empowering parents—including linguistically diverse parents and parents with disabilities—is critical to children's literacy development. Projects that support parents in cultivating home literacy environments are important. For example, [Born to Read](#) is an organization that brings volunteers into birthing centers in North Carolina to offer new parents gift bags that contain newborn supplies and books alongside advice regarding the importance of reading from birth and early ages. The Bookworm intervention program for parents of infants in the neonatal intensive care units of hospitals effectively increased parents'

time spent reading to their infant at home and in the hospital—for parents who did not enjoy reading—and lowered parental stress and facilitated bonding (Jain et al., 2021). Further, programs like [Bookelicious](#), a website that curates quality and age-appropriate books, is helpful for both teachers and families. Bookelicious can provide books that celebrate and honor diversity, allowing children to see their cultural, racial, and ethnic backgrounds represented and celebrated in their books. European American culture tends to be overly represented in children’s books which can contribute to the lack of book reading that ethnic minority youth are exposed to at home (Luo et al., 2020). Supportive home literacy environments prompt brain development, illustrating a bi-directional, mutually reinforcing relationship between biology and the learning environment (discussed in more detail in Learning 3).

c. “Bringing these different fields together is the first step” (F. Hoefft, advisory board member)

Even with extensive research on how students learn to read, how to teach literacy skills, and what characterizes productive social-emotional learning environments, the research community has yet to comprehensively integrate longitudinal investigation of literacy development with the investigation of social-emotional growth in order to more comprehensively reveal and support the assets students of color and students living in poverty bring to their educational experiences. As advisory board member Fumiko Hoefft said, “bringing these different fields together is the first step.” Advisory board member Joanna Christodoulou echoed this and stated that, “longitudinal work is the most powerful way to get in there,” adding that the relationship between literacy and social-emotional experiences becomes even more complicated as students progress through school. Such an asset-based approach illuminates the cultural funds of knowledge in individuals, ultimately affirming their lived experiences and improving their social-emotional development. Advisory board members echoed that we can better understand and close the literacy gap when we consider students’ social-emotional needs and cultural funds of knowledge as critical assets to reading self-efficacy. However, the cultural capital of low-SES students and students of color is generally under-supported and not well understood.

Therefore, to best support our target groups of students, we must pursue asset-based, longitudinal research centered on students’ community cultural wealth, literacy development, and social-emotional growth. Advancing the science of reading to be more responsive to students of color and of low-SES will require significantly more concerted efforts with integrating families, communities, and educational practices into the research process (Hoffman et al., 2021).

d. Aligned questions to move the field forward

To move in this direction, we suggest future research addresses:

- *How do social-emotional and literacy skills develop longitudinally in a coordinated fashion in the brain and mind, and how is this development understood and experienced by diverse youth and communities?*
- *How could instructional practices be improved and adapted to various groups by harnessing research in motivation and engagement, brain science, and child and adolescent psychology?*

Lines of inquiry that might contribute to addressing these broader questions would utilize strengths of interdisciplinary teams and methods to ask important questions. Does a youth's identity as a reader enable their development of civic identity in the community? Does this translate into psychosocial outcomes and brain development long-term, in and beyond adolescence? What insights can neuropsychological research provide into the developmental trajectory of self-efficacy in reading, especially for students with reading differences and/or challenges? How should pedagogy reflect development across the grade span, and how is this process shaped by race, ethnicity, and SES? How is the development of self-efficacy in reading unique in students with reading differences and/or challenges? How do we build a student's self-efficacy in reading in grades PK-8 and in high school, and what instructional practices are effective?

As one example of a line of inquiry in this vein, we consider the case of long-term English Language Learners (ELLs)—students who continue to struggle with English after more than six years of enrollment in U.S. schools. Significant research has explored and explained language- and literacy-related challenges that contribute to these students remaining as ELLs. Other high-quality work has explored the intersection of culture and developmental linguistic practices. To our knowledge, no research has explored development processes in the social-emotional domain that contribute to understanding why students linger as ELLs. This area is ripe for research given that the emergence of long-term ELL status coincides with the adolescent period when profound social-emotional and identity related changes occur (Erikson, 1950), and given that identity related questions can be especially complex for multicultural youth in immigrant families (Bacallao & Smokowski, 2009; Suárez-Orozco, Abo-Zena & Marks, 2015). There are numerous positive sociocognitive benefits for youth of healthy integration of heritage and national identities, and schools plays a major acculturating role in immigrant-origin youths' lives. As such, research that investigates supporting identity-building processes in conjunction with supporting literacy and academics could be effective for improving literacy outcomes for long-term ELLs who struggle within our existing structures.

3. In the brain, socio-emotional, cognitive, cultural, and academic capacities are fundamentally and inextricably intertwined. As such, educationally relevant sociocognitive traits, including reading ability and self-efficacy, are malleable and may improve with improved instruction and environmental conditions. Though individuals vary on their biological and sociocognitive propensities, all youth do better when their self-efficacy as a reader and as a cultural community member are honored and supported.

a. The confluence of biological and social factors shaping literacy development

Biological dispositions, environmental factors, and the interaction of our biology and experience all contribute to our reading ability, sociocognitive traits, and literacy self-efficacy (Immordino-Yang, Krone, & Darling-Hammond, 2019). Further, there are multiple, interacting social and environmental forces, ranging from the home to broader social and temporal situations, that shape young people's development—including in literacy (Bronfenbrenner, 1977). Our brains are shaped by our cultural experiences, and, conversely, our experiences are shaped by our biology and dispositions. Socio-emotional, cognitive, cultural, and academic capacities

are fundamentally and inextricably intertwined, and are shaped together by factors in both the brain and the environment (Immordino-Yang, 2015; Immordino-Yang & Gotlieb, 2017). Educational experiences must attend to this mutually reinforcing relationship between our brains and environment to promote healthy development and literacy growth.

The confluences of forces that shape literacy development is perhaps clearest in the case of individuals with dyslexia. Dyslexia is a learning disability that most prominently affects reading (Lyon, 2003). It is neurobiologically based (Hoeft et al., 2006; Shaywitz & Shaywitz, 2008) and manifests as core deficits related to phonology and linguistic fluency. These core deficits can occur in individuals with strong cognitive abilities and instructional opportunities and can also be accompanied by significant characteristic talents, such as exceptionally strong visual pattern recognition abilities (Wolf, 2008). Because of the complexity of biological and environmental factors that contribute to literacy skill—and because of the developmental nature of dyslexia—controversy exists over how to disentangle students with “true” dyslexia from students with lack of opportunities or with histories that have complicated literacy development (sometimes called “garden variety” poor readers). As Claudia Koochek contributed—and members of the advisory board reiterated—when educators do not understand the possible contributions of “true” dyslexia to reading struggles, students from low-SES circumstances and other marginalized and linguistically diverse students are less likely to receive the literacy support they need. The core deficits in dyslexia often manifest as difficulty with word recognition, spelling, and decoding. They may also produce downstream problems with reading comprehension and background knowledge. As suggested by Scarborough’s (2001) reading rope and Frith’s (1986) developmental model, there are so many processes involved in becoming a skilled reader (e.g., vocabulary, phonological awareness, etc.), and when any of these go wrong, it is possible for dyslexia risk to increase. (Advisory board member Suzanne Nguyen spoke to the utility of the reading rope in understanding reading challenges in her work with New Mexico’s Native youth.) There is extensive research on the genetic basis of dyslexia (e.g., Black et al., 2012; Snowling, Gallagher & Frith, 2003), as well as the influence of various positive and adverse environmental factors that can predict reading success or struggle (e.g., Baker, 2013; Molfese, Modglin & Molfese, 2003; Walker et al., 2011). Given these complexities, compelling research suggests that combining neurological and psychological perspectives and methods in the study of dyslexia can be especially effective (e.g., Black, Myers & Hoeft, 2015; Dehaene, 2009; Hoeft et al., 2007; Wolf, 2009).

b. Students’ skills and self-efficacy are changeable, especially with practice in school, mentorship in the community, and joint reading at home

Environment has a large influence on literacy development, and there is growing evidence that neurobiology is shaped by youths’ experiences. It is abundantly clear that educationally relevant sociocognitive traits—including reading ability and self-efficacy—are malleable and may improve with enhanced instruction and environmental conditions (Molfese et al., 2003; Walker et al., 2011). Students—especially those who experience reading difficulties—benefit from environments that promote a growth mindset and positive interpersonal relationships (Haft, Myers & Hoeft, 2016). Classroom climates that affirm student identities, build upon the capacities, skills, and dispositions students already have, and develop positive cultures of learning and development

can improve students' self-efficacy. Culturally sensitive and relevant practices include welcoming the whole child into learning experiences and centering instruction on students' cultural identities, knowledge, and community cultural wealth (Immordino-Yang et al., 2019). For example, research highlighting the resilience of African American youth has shown that when these students perceive their educational surroundings to be supportive, they are more likely to experience increased academic self-esteem (Cunningham & Swanson, 2010). This is particularly pertinent for students from diverse cultural and socioeconomic backgrounds who benefit greatly from—and are less likely to receive—instruction that relates to their lived experiences and affirms their belongingness in academic spaces (e.g., Gray, Hope & Byrd, 2020). Early exposure to such supportive learning environments powerfully influences literacy development (See Learning 4).

Outside of the classroom, community projects and organizations can also cultivate positive socio-emotional tendencies to support literacy development. For example, [Project Eye to Eye](#) brings middle school, high school, and college students with learning differences together to engage in shared experiences that develop critical skills needed to thrive in and out of school. As such, Project Eye to Eye encourages students with learning disabilities—at a vulnerable time in their development—to cultivate socio-emotional self-advocacy and efficacy. The younger students gain inspiration from positive role models, while the older students cultivate leadership skills and deepen their own self-understanding.

Another example of an effective mentorship program for cultivating sociocognitive and literacy relevant skills is [Sages and Seekers](#). This program pairs seniors with adolescents to share each other's personal life stories through an acclaimed 8-week storytelling curriculum designed to support well-being. One investigation of this program, with low-SES youth of color, suggests that these meaningful relationships and thoughtful engagement with story narratives helped increase youths' sense of life purpose and values-driven goals in ways that other work had shown could contribute to developing advantageous patterns of neural connectivity in their brains (Immordino-Yang & Knecht, 2020; Riveros & Immordino-Yang, 2021).

Though individuals vary on sociocognitive propensities and neurological potential for reading disabilities, youths' literacy skills blossom when their self-efficacy as a reader and as a cultural community member is honored and supported. The examples of Project Eye to Eye and Sages and Seekers, as well as statements from educator and researcher advisory board members, all speak to the importance of mentorship—particularly with well-matched mentors—for promoting literacy self-efficacy.

Home literacy environments also provide opportune spaces for positive literacy development. Frequent opportunities to partake in literacy-related activities at home, such as when parents and children read together, lead to improved educational and social-emotional outcomes (Baker, 2013). This can be particularly important for youth with reading difficulties because it helps these children imagine themselves as readers and affords them opportunities to engage with text in pleasurable ways that establish comprehension skills (Willingham, 2015).

In light of the evolving and interacting influences of biological and cultural forces on individuals' abilities and behavior, it is important to understand traits and identities as malleable and context-dependent (Gutiérrez & Rogoff, 2003). This is especially true for youth of color and those from lower socioeconomic backgrounds. These students may be subject to more negative stereotypes in school, and may experience academic environments as threatening. Often, such youth experience multiple, compounding stereotyped aspects of identity (Tine & Gotlieb, 2013). As such, the environment could interfere with learning and with reading self-efficacy, rather than helping students understand that their academic performance can grow.

c. Examples of research investigating the intersection of biological and environmental impacts on reading for low-SES students

Advisory board member Joanna Christodoulou discussed ongoing work she is conducting with funding from the National Institute of Health that offers an example of how we gain insights into the complex, interconnected set of factors that shape reading. Christodoulou's team is investigating differences within and across SES groups in the ways students spent their time during the summer and how these experiences, together with indicators of dyslexia risk, impact their school and reading performance the subsequent year. In a similar line of research, Christodoulou and her colleagues found that especially for students with reading disabilities from low-SES backgrounds, summer reading programs can improve reading and forestall reading slippage over the summer (summer slide), and were associated with growth in the brain (Romeo et al., 2018). Work in this vein highlights the importance of out-of-school time for students' reading development, the ways this can differ across groups, and how it interacts with more innate factors to create a student's literacy profile.

4. There are windows of risk and opportunity during the developmental trajectory from birth to early adulthood in which particular literacy-, social-emotional-, and identity-relevant skills can be optimally supported. There is substantial individual and contextual variability in the dynamic development of these skills.

Recent frameworks created through the synthesis of research from the learning sciences, education, and developmental psychology have established that literacy-, social-emotional-, and identity-relevant skills are interlaced and constantly evolving throughout child and adolescent development—and that the evolution of these skills is highly dependent on individual and contextual variability (Darling-Hammond et al., 2020; Fischer & Bidell, 2006; Immordino-Yang et al., 2019). Children's skills “are vulnerable to biological and environmental insult, amenable to environmental support, and may demonstrate measurable change over time” (Raver, 2004, p.349; See also Learning 3). There are windows of risk and opportunity during the developmental trajectory in which the formation of these skills is particularly sensitive—such as during the prenatal period, infancy, early childhood, and adolescence.

Even before birth, the growing fetus learns to recognize its mother's voice and the sounds and combinations of sounds that are used in the languages within its community. After birth, babies can recognize music and story books they were exposed to in utero (Hepper, 1988). Here we see that the foundation for social relationships and for reading begin to develop extremely early.

Researchers and clinicians alike have emphasized the importance of daily reading with infants and toddlers. Parents' language and literacy skills and mental health affect their child-directed speech and the growth trajectory of toddlers' vocabulary (Golinkoff et al., 2015; Pan et al., 2005). In fact, at the neural level, young children's exposure to dynamic conversation at home has been shown to affect the extent to which Broca's area—a part of the brain critical for language—is active when listening to a story, even above and beyond the effects of SES or the number of words a child has heard (Romeo et al., 2018). However, too many young children, especially those in our target groups, are not read to daily because of lack of books in the home, lack of time to read (such as when parents have to work multiple jobs), parents' negative attitudes towards reading, or parents' inadequate literacy skills (Duursma, 2008; Sinclair et al., 2018). We heard from expert educators and researchers on our advisory board—multiple times—about the need to educate parents about the importance of reading to children, and the need to support parents' reading self-efficacy in the home. Programs such as “[Born to Read](#),” “[Reach out and Read](#),” and California's [First5](#) initiative aim to mitigate barriers to family reading by providing free books to families with infants and young children and by supporting community education around the importance of early reading, talking, and singing in a developmentally appropriate way (Zuckerman & Needlman, 2020).

Research suggests that preschool and kindergarten years are critical for developing reading skills such as awareness of phonemes and syllables. The literacy skills developed in preschool have been shown to translate to reading ability later in childhood (e.g., Scarborough, Dobrich & Hager, 1991) and intervention in early childhood has the greatest chance of stemming reading challenges. The social nature of reading development is apparent when we consider the role of parents, home, and school environment for providing children with exposure to language, reading, and broader literacy support during this time.

The transition from third grade to fourth grade has been characterized as representing a shift from learning to read to reading to learn. While this may be descriptive of typical curricular and instructional practices, scientific evidence does not support the idea that students are ready to make such a transition (Coch, 2015). Rather, reading and literacy develop in a slow and continuous fashion over many years, and the subcomponents of each may develop asynchronously within a student and differently across different students (as suggested by dynamic skills theory; Fischer and Bidell, 2006). While it is critical to support early literacy (in fact, reading rates in third grade are used to predict the number of prison cells that will be needed in the coming decade), if students have not learned to read by the end of third grade, it is wrong to assume that the window in which they can do so has closed. The reality is the period of learning to read extends well beyond third grade.

Adolescence is a period of tremendous cognitive, identity, and social-emotional development (Gotlieb et al., 2022; Steinberg, 2014). Literacy skill can improve as a function of this development and can facilitate it. As adolescents come to reason more abstractly about the social world around them, they develop skills for deep, analytic, and compassionate reading. Students' identities are informed partly by the literature and curriculum they experience in school (Quinlan & Curtin, 2017) and their literacy skills impact their ability to explore and express their emerging

sense of self. Adolescents' heightened social inclinations also present vulnerabilities to their literacy development. If students do not see themselves and their individual and cultural backgrounds represented in their schoolwork, this may drive a false dichotomy between their identity as a whole person and their identity as a student. Adolescent learners without strong literacy skills may experience tremendous shame and even trauma around reading. They need to feel intelligent, able to learn and improve, and safe in school to be open to learning to read (See also Learning 2).

In these examples, we see the need to study literacy with a situated, developmental lens.

4a. “*The Matthew Effect*” suggests that the more a student has or exercises a particular sociocognitive skill, the more they will continue to develop that skill (i.e., the sociocognitively rich get richer). This suggests the importance of attending to children’s sociocognitive developmental needs across the various contexts in which reading is engaged.

With reference to the parable in the Gospel of Matthew that “the rich get richer, and the poor get poorer,” Keith Stanovich (1986, 2009) has suggested that children who know more words will learn more words and students who read more will learn more from the texts they read. Students who enter school with stronger academic and social skills will go on to develop those skills in greater measure than their peers. Talking, playing, and reading to children is one of the best ways parents can support children’s school readiness. School readiness is most easily developed in an environment that includes positive and nurturing parenting (Brooks-Gunn & Markman, 2005) and is free from chronic stress, especially stress associated with poverty (Blair et al., 2011).

Children living in chronic poverty tend to experience higher levels of stress—and possibly trauma—which can affect academic engagement and performance by impacting basic cognitive functions (e.g., working memory) (Evans & Schamberg, 2009). Similarly, African American children have historically had poorer reading achievement due to a combination of factors including poverty, dialectic variations, and teacher and testing biases (Washington, 2001). Many children who experience poverty and many children of color are at-risk of entering kindergarten without the skills they need to meet the demands of school could benefit from interventions that improve school readiness so that they can start accruing greater academic benefits early.

As such, there is evidence that preschool through Kindergarten is one of the best times to intervene and improve children’s school readiness skills, especially for children experiencing low SES (e.g., Blair & Raver, 2014; Diamond, 2002). Preschool interventions are likely to be more effective than later interventions, in part because the brain is especially plastic during this period (Nelson, 2000). Longitudinal studies have shown that interventions in preschool and kindergarten are linked to positive outcomes in high school and beyond (e.g., Stanley, Petscher, & Catts, 2018). These outcomes include increased math and reading achievement and—decades later—increased likelihood of attending a 4-year college (Campbell et al., 2002). One of the best-known preschool intervention programs is the [Abecedarian Project](#). This project included a high-quality preschool, beginning when children were only 4 months old and lasting until the children were 5 years old. Other studies have shown the benefits of a high-quality preschool

([Perry Preschool](#)) last more than 40 years (Schweinhart et al., 2005). Children who participated in the Head Start REDI intervention showed a significant increase in academic, social-emotional, and executive functioning skills (Bierman et al., 2008). A public prekindergarten program that included high quality literacy and math curriculum as well as a teacher training component has been shown to provide many benefits to children regardless of SES background, but children from lower SES experienced greater benefits (Weiland & Yoshikawa, 2013). In this way, early interventions—especially for children from disadvantaged backgrounds—have a much higher sociocognitive and economic return on investment than later interventions (Heckman, 2006).

Results from these studies suggest that preschool interventions can improve children’s social-emotional and academic skills. Programs that explicitly teach social-emotional skills, along with traditional early math and literacy skills, are likely to be the most effective.

4b. Numerous studies show the importance of early screening and literacy intervention for preventing or reducing long-term academic and social-emotional struggles. However, there is significant (and historically justified) misunderstanding and resistance to early screening among low-SES and linguistically diverse students and students of color.

Early screening (i.e., assessing children on their skills in one or more academic or social-emotional areas) of all students is the best way to determine which students need interventions. It is promising, then, that more than half of U.S. states have passed or are considering legislation to require early, universal screening for the possibility of reading difficulties in students. Experts recommend that screening should begin as soon as students enter school or, when possible, even before through pediatrician appointments. Neural and behavioral indicators of dyslexia may be present even in children’s first year of life, suggesting the possibility that very early screening could be useful in providing the services needed to circumvent later reading problems (Lohvansuu et al., 2018). Given heterogeneity in the profiles of students who may go on to struggle with reading (Ozernov-Palchik et al., 2017; Wolf & Bowers, 1999), screening is helpful for identifying students’ area of challenge and the type of intervention that might be most beneficial.

In addition to helping a variety of students, early screening has the potential to reduce disproportionality in special education (See Learning 7). For instance, universal screening (i.e., testing all students, rather than only students whose teachers refer for testing) has been shown to help reduce the overrepresentation of boys in special education (VanDerHeyden, Witt & Gilbertson, 2007). Given that language-minority students are underrepresented in special education in younger grades and overrepresented in older grades (Samson & Lesaux, 2009), early screening—if designed appropriately for this population—could help these students receive services sooner, before problems lead to underachievement and self-efficacy issues. [EarlyBird](#) and [DIBELS](#) are two examples among many assessments (see those reviewed by the [Gaab Lab](#), directed by Advisory Board member, Nadine Gaab) that aim to identify learning difficulties before formal schooling or before reading challenges fully manifest.

As multiple scientific and educator members of our advisory board mentioned, screenings are only useful if the data they produce are linked to interventions, services, and tailored instruction

for children. Early literacy interventions are more effective than later interventions (Lovett et al., 2017), which is why early screening is important. A study by Lovett et al. (2017), for instance, found a multi-component reading intervention for first grade students helped at-risk students catch up to their typically achieving peers. A large-scale randomized control trial of multi-component interventions for children with reading disabilities suggests strong effects of intervention for students across races, SES, and IQ, and shows multiple possible pathways toward reading remediation (Morris et al., 2012). For English Language Learners, offering instruction in one's native language is now recognized as a best practice (Bialystok, Luk & Kwan, 2009; Vaughn et al., 2006). By first learning to read in the language with which they are most familiar, students better understand the purpose and logic of reading and develop strong literacy skills over time that serve as a foundation for their future success in English-based academic instruction. One example of a non-English literacy program, [Estrellita](#), is an accelerated, beginning Spanish reading program that supports students in learning to read in their native Spanish language. Advisory Board member Veronica Pedroza has found great success with this program among her students. As she explained, intervention has the potential to prevent students from experiencing the multiple negative sequelae of reading failure, both with regard to reading skill and to self-efficacy in reading.

Despite the promise of early screening for improving literacy, there are challenges. One practitioner advisory board member who directs bilingual education for a large, linguistically and culturally diverse district, Suzanne Nguyen, spoke of the confusion her district experienced in understanding how to operationalize the new legislative requirements for universal screening. Given that there are not currently high-quality screeners available for linguistically diverse youth (although some are being developed by the UCSF Dyslexia Center) and given that Nadine Gaab explained that there is not even consensus among researchers about whether students should be screened in English, their home language, or some combination, it is little wonder that practitioners experienced confusion with implementation. Veronica Pedroza, an educator advisory board member, suggested that in the short-term, one very easy adjustment to help improve screenings for multilingual young students is simply to make explicit that the test they are taking is meant to be answered in English. Doing so helps children understand that English is one mode of communication, but that other modes are also available and valid in other contexts, hence validating the value of their home languages.

In addition to linguistic diversity, there is also great dialectic diversity among our students. As several scientists and educators pointed out in our reflection groups, students who speak dialects that are not supported in schools (e.g., African American Vernacular English) or even those who have been exposed to multiple accents (e.g., military children who move frequently to different parts of the country) may underperform on screeners that are not designed with sensitivity to these dialectical differences. Aside from mismeasuring these youths' reading skill, such problems also place burden to "translate" between dialects on the child, and can be perceived by the child as suggesting that their home dialect is not valuable.

Another challenge with screening students comes in the form of parent pushback. For half a century, our country has debated and litigated the use of IQ tests in education (going back at least to *Larry P. v. Wilson Riles, 1972*). This debate has been so vigorous because communities of

color know all too well how these sorts of data can be weaponized against their children to label them as deficient and undermine their learning resources in other ways, a fact that advisory board members Tracy Fray-Oliver and Jeffrey Garrett emphasized. To make progress towards implementing universal screening, schools and educators need to build trust in the community by first acknowledging this unjust practice and explaining how universal screening could be used to get their children access to needed services. Addressing wide-spread misunderstanding among parents about the role of screening versus diagnosing learning disabilities could also be helpful. Just as knowing whether or not someone is female and of reproductive age offers clues as to their *chance* of possibly being pregnant but does not provide definitive information about whether they are pregnant, so, too, can literacy screenings offer information about one's *chance* of having dyslexia. Similarly, screeners are not a tool to diagnose dyslexia or other learning disabilities. Additional testing is needed to diagnose. As another step, educating parents about the fact that learning disabilities are not neuropsychological deficits or problems with intelligence, but rather just differences with assets in some contexts, could be useful (Rappolt-Schlichtmann & Evans, 2018). Finally—as Joanna Christodoulou and Tracy Fray-Oliver mentioned—when parents realize that learning disability diagnoses may entitle their child to receive helpful, tailored supports, they may be more open to considering screening and, if needed, diagnostic assessments (See also Learning 7).

As mentioned above, screening is only useful to the extent it leads to students receiving targeted interventions or exposure to more helpful literacy instruction. There is still widespread confusion among schools about how to use their screening data, and too many educators—especially secondary school teachers—are not taught how to support reading development in struggling students (a fact that Erin Whalen and Jeff Garret underscored, in addition to scientists). Ensuring classrooms align with principles derived from the universal design for learning (see also Learning 8) so that they are accessible to diverse learners is important, especially until more culturally appropriate screening technology and practices are established. As these screeners become available, teachers will also need additional training about how to intervene for kids in need of reading support.

4c. It is never too late to intervene for individuals who are struggling to read, and well-designed reading interventions can have transformational impact on youth and society. The adolescent period in particular involves developmental and neuropsychological maturation that can be leveraged to support literacy in this age group. *More research is needed on the developmental intersections and synergies between reading skills, literacy self-efficacy, social-emotional functioning, and brain development among adolescents of color and those living in poverty.*

Even before the disruptions to instruction caused by the COVID-19 pandemic, fewer than 4 out of every 10 eighth graders in the U.S. were proficient readers (The Nation's Report Card, 2018). As such, we need to better support basic literacy skill development among middle and high school students. Although reading interventions for students in middle and high school yield smaller gains than reading interventions for younger students (Scammacca et al., 2007), some reading interventions are quite effective for this age group (i.e., Edmonds et al., 2009; Flynn, Zheng, & Swanson, 2012; Lovett & Steinbach, 1997; Scammacca et al., 2007; Wanzek et al.,

2013). Reading interventions for older students work best when they: (a) are designed with adolescents' maturing needs in mind (Yeager et al., 2018); (b) include a focus on motivation and engagement (Cockroft & Atkinson, 2017; Kim et al., 2017; Lovett et al., 2021; Torgesen et al., 2008); (c) are administered in small dyads and triads over multiple years with progress monitoring (Lovett & Steinbach, 1997; Vaughn et al., 2008); and (d) include a focus on comprehension (Suggate, 2010). Notably, factors like motivation and engagement predict reading achievement at least as well as students' SES (Froiland & Oros, 2014). Specific programs that show promise for supporting older students who struggle with reading include PHAST (Lovett et al., 2021), [READ 180](#) (Lang et al., 2009), and [REWARDS Intermediate](#) (Vaughn et al., 2009). Multi-component interventions that focus on word meaning, understanding context, and teaching comprehension strategies are particularly helpful (Scammacca et al., 2007).

Many high school teachers are not trained in how to teach basic reading skills like phonological decoding and may feel like it is outside the purview of their responsibilities to teach these skills. Given that reading struggle is so prevalent among middle and high school students, and that some students do not respond to early intervention (Al Otaiba & Fuchs, 2002), secondary school educators—especially those working with our target populations—should receive training in basic literacy instruction. Further, since most students with reading difficulties benefit from reading interventions—and substantial reading support may not be provided in general education classrooms—middle and high school special education teachers should be taught how to explicitly teach reading skills (decoding, fluency, comprehension). These reading interventions should be researched-based, grade appropriate, and culturally sensitive, with supports both for skill and for self-efficacy. Special care needs to be paid to the shame or apathy that older students may feel after years of reading struggle. Time should be set aside in older students' busy school schedules so they have the opportunity to work on reading, if that is necessary. Advisory board members Jeffrey Garrett, Mary Shimazaki and Erin Whalen reinforced the importance of this. When reading practice occurs in a context of interest to a student or in service of a larger goal the student has, it is more likely to be effective. The Haskins Lab curated [book list](#) of high-quality books for infants through adolescents can serve as a starting point.

While there are currently some promising programs for older struggling readers, much more research is needed about the ways to leverage adolescents' emerging social-emotional and cognitive capacities to support literacy development. This is especially important for adolescents of color, those living in poverty, and long-term English learners given that, on average, these groups struggle with reading to a larger extent and have been underrepresented or entirely neglected in basic cognitive and brain science research.

4d. High quality instruction is developmentally and culturally appropriate, integrative, and holistic, and leverages assessments to support targeted interventions and opportunities for youth.

To cultivate a classroom environment that evolves to meet the moment and adapt as social contexts evolve, high quality instruction that is developmentally and culturally appropriate, integrative, and holistic is required. Culturally Relevant Pedagogy (CRP) strives to achieve just this. CRP is a student-centered approach to education that incorporates the cultural backgrounds

and assets of historically marginalized students and their families into teaching and learning. This is rooted in equity, acknowledging that educational conditions have failed to facilitate the learning of many individuals from culturally, racially, and economically diverse backgrounds. This mode of pedagogy discourages reliance on didactic instruction; rather, it aims to actively engage all students in the construction of knowledge together. Relationships between students and teachers are central to CRP. Teachers acknowledge and affirm the unique backgrounds and experiences students bring into the classroom, and they use these assets to develop instruction that is motivating and relevant.

Traditional pedagogy often promotes a false dichotomy between students' personal lives and their identity in school. It disregards the various cultural backgrounds and perspectives that students bring to the classroom. In contrast, fostering children's socioemotional development, recognizing their unique cultural perspectives, and integrating these into their academic development supports deeper learning and engagement as well as the development of critical thinking, communication, collaboration, and self-management skills (Martinez & McGrath, 2014; Alliance for Excellent Education, n.d.).

To be effective in implementing holistic CRP, teacher preparation programs need to help teachers-in-training develop dispositions and practices for teaching that promote deeper learning for their students (Darling-Hammond & Oakes, 2019). Effective teacher education centers on helping teachers develop skills that increase their ability to evaluate teaching situations and therefore develop teaching responses that can transfer between different contexts and feel relevant to students of different cultural backgrounds (Darling-Hammond & Snyder, 2000).

Skilled educators implement pedagogy with a cultural lens and with sensitivity to students' diverse backgrounds, all the while recognizing that there are some basic principles that constitute effective instruction for students across backgrounds. Some key practices have been described as 1) instructing literacy in both indigenous and dominant languages; 2) connecting and embedding learning in the existing values of the community; 3) building intersections among cultural knowledge, academic proficiency, and community service; and 4) assessing students using authentic tasks (Keehne & Sarsona, 2018). With reading instruction there are some practices that are essential for students, such as teaching phonics (see Learning 5), but the way these practices are framed should be enriched by and embedded in students' authentic cultural experiences.

High quality education also recognizes the ways in which students' identities intersect with each other. One such intersection is between neurodivergence and cultural diversity. Understanding the role of culture in students' lives will help create environments where students with learning disabilities from culturally and linguistically diverse backgrounds are affirmed and can be better supported in their learning (Utley, Obiakor & Bakken, 2011). An example of an educational tool that supports the intersection of learning disabilities and cultural diversity is the "[Doctor Dyslexia Dude!](#)" graphic novels by Dr. Shawn Robinson that detail a compelling story of an African American boy who is also a colorful superhero with dyslexia. See also this [list of books](#) from the Yale Center for Dyslexia and Creativity for young people with dyslexia that helps readers see themselves reflected in the stories they read, as well as the [list of novels and resources](#) prepared by John Gabrieli's lab at MIT.

One important piece in developing culturally and developmentally appropriate pedagogy is developing learning assessments that are also culturally sensitive and instructive. When creating “nationally normed” reading assessments, it is important to be explicit and transparent about the makeup of the sample on whom the assessment was normed so that researchers and educators can assess generalizability or comparability to their context. Culturally appropriate assessments consider the different cultural practices that influence children’s development. For example, to address the historical bias in language and literacy assessments, language assessments might consider African American children’s use of AAE (Craig & Washington, 2006), or their oral narrative skills (Gardner-Neblett, Pungello & Iruka, 2012), neither of which would be taken into consideration in traditional language assessments. Dynamic assessments are widely accepted as culturally fairer, and well-constructed non-standardized assessments are gaining favor as less culturally biased (Washington, 2001). Additionally, formative, progress-monitoring assessments that offer timely, targeted feedback can actively and effectively support students’ learning rather than merely capturing a snapshot of what they can do. A long-time progressive expert educator with experience as a classroom teacher and school and district administrator recently told us that he is tired of schools “sorting and not supporting” students. More culturally sensitive and formative assessments can help us move toward supporting rather than sorting.

Inspired by Learning 4, we encourage a line of future work that seeks to answer: *How can we measure literacy as it occurs in authentic contexts in diverse communities?* How can educators be supported in leveraging literacy to create: school and classroom practices that encourage students to bring themselves and their prior knowledge fully to the classroom; safe spaces to explore one’s sense of self; opportunities to contribute to the community and honor diverse cultural practices; and family and community involvement in students’ learning experiences? What special pedagogical supports or assessments may be helpful for students of color and those living in poverty to develop self-efficacy in reading? For students with dyslexia or other reading challenges? For English Language Learners? For students whose profiles on these categories intersect?

5. Given overwhelming evidence, it is time to put an end to the so-called “reading wars” by uniting all advocates for young people’s literacy behind explicit, early instruction in phonology (and putting to rest a whole-language approach). A richer understanding of language—including appreciation of bilingualism and community dialects—enhances literacy development. Optimal reading instruction includes direct instruction also in orthography, semantics, syntax, and morphology. It supports, in a culturally-responsive way, the integration and expansion of students’ linguistic diversity, background knowledge, social relationships, and sociocognitive skills.

Humans have been reading for only about 6,000 years. A cultural invention this recent, on an evolutionary time scale, could not possibly have shaped the evolution of the human brain. Indeed, in the brain, there is no natural or innate reading circuit. Instead, each new reader creates the structures in their brain to support reading. Over the course of 20 or more years, structures distributed throughout the brain that evolved to support evolutionarily older cognitive, linguistic, attentional, and affective tasks are repurposed to support reading (Dehaene, 2009; Dehaene &

Cohen, 2007). Given the unnaturalness of reading relative to spoken language, students do not learn to decode written language simply by observation—explicit instruction is necessary (Wolf, 2008). How this reading instruction takes place has sparked a vigorous debate.

The “reading wars” have raged for decades (see Castles, Rastle & Nation, 2018). One side, the phonics group, has shown that explicit phonics instruction (i.e., learning the relationship between letters and sounds) is necessary for all students. The other group, the “whole word” group, believes that children should focus on the “whole word” without breaking it down into its more basic sounds. They argue that students should direct their attention to the shape of the word or context clues (i.e., other words, pictures, the flow of the sentence). The research base for explicit phonics instruction (i.e., the science of reading; see Petscher et al., 2020), both in terms of its theoretical foundation in cognitive psychology and neuroscience (e.g., see Kovelman et al., 2012) and in terms of evidence from intervention research, is much stronger than the research base for “whole word” instruction (Jeynes & Littell, 2000). Nonetheless, “whole word” instruction advocates have led the way in creating and disseminating reading curricula, such that millions of students receive literacy instruction that is not aligned with what rigorous research has shown to be optimal.

More recently, fewer educators are explicitly identifying as “whole word” proponents, but many who are sympathetic to the “whole word” approach have assumed the mantle of “balanced literacy.” The “balanced literacy” group is correct in suggesting that context matters for comprehension and in encouraging children to read text that is engaging and meaningful to them. While a true balanced literacy approach that includes phonics as well as instruction in narrative arcs, the development of rich background knowledge, etc. would be optimal for supporting deep reading (Willingham, 2017), those who use the term “balanced literacy” typically support and practice instruction that relies too heavily on context clues, and not enough on phonics instruction. Unfortunately, many current instructors have never been properly taught about the science of reading. While there have been federal and state-level policy changes to support literacy instruction informed by the science of reading (e.g., Reading First) and while some media organizations such as Sesame Street have incorporated the science of reading into their products to the benefit of millions of young children (see [here](#) for an example of Sesame Street phonics instruction), change is slow. Especially after two years of pandemic-related disruptions in reading, supporting phonics instruction in the general education classroom and through intervention, when necessary, is critical for young students right away. There are several evidence-based programs that are phonics-based, including [Wilson Reading System](#) and LiPS. Programs like PHAST (Lovett, Lacerenza & Borden, 2000) and [RAVE-O](#) (Wolf, 2010; Wolf et al., 2009) are not only phonics based, but also attend to metacognitive skills and other elements of language and reading that improve literacy development. Advisory board member Maryanne Wolf uses the acronym POSSuM to summarize core elements of reading instruction that interventions should include (as the intervention that she created [RAVE-O] does): phonology, orthography, semantics, syntax, and morphology (Bowers et al., 2010; Cain et al., 2004).

The next frontier for reading curricula is to attend even more fully to the social-emotional experience and cultural diversity of budding readers. Learning to read can be a challenging and emotionally charged process for many young people; cultural, linguistic, and dialectic diversity

can shape how reading skill is acquired (Goldenberg & Coleman, 2010; Seidenberg, 2017; Suarez-Orozco et al., 2015; Washington & Seidenberg, 2021; see Learning 6). Even aspects of literacy beyond word reading, such as the viewing of images and nonverbal communication, are shaped by culture and require appropriate adaptation of instruction (Seidenberg, 2017). The science of reading has made certain core elements that must be part of reading instruction clear. We encourage future work that examines how these elements might be adapted to different cultural contexts and for different groups of readers. Advisory Board member Daniel Willingham expressed that there are two types of questions to address in this space. One involves deepening our scientific understanding (e.g., of the relationship between culture and literacy development) while the other involves learning how to implement practices that are already supported by uncovering core elements for replication and understanding how to adapt these elements to students' unique contexts.

6. How young people come to understand themselves and their social context—as well as the concordance they feel between their values, beliefs, and identity and the experiences and expectations of them at school—affects how and how much these young people engage with reading-related activities and school more generally. Self-efficacy development is a critical piece, and must be understood in the complexity of its developmental landscape. Teachers' self-efficacy affects the school experience for students, especially for students whom teachers may find challenging to serve.

a. Reading self-efficacy

Reading self-efficacy relates to people's belief in their ability to succeed in (and improve at) reading (following Bandura, 1977). Individuals with higher levels of self-efficacy tend to show more cognitive skills, engagement, and self-regulation, as well as better academic and reading outcomes (Carroll & Fox, 2017; Pajares, 1996; Schunk, 1989; Hall, 2012). In contrast, students with low self-efficacy tend to show poorer psychosocial adjustment and often perform worse academically. As Advisory Board member Joanna Christodoulou said, "sometimes students don't feel that the identity of 'reader' is something they are worthy of." Low reading self-efficacy is more common in children from low SES households, racial minority youth, and students with reading disabilities.

Fortunately, reading self-efficacy is malleable (See Learning 3) and educators can create conditions in which students' self-efficacy might grow by supporting skills like phonological awareness and letter sound knowledge, as well as helping to build students expansive and diverse conceptual knowledge and appreciation of language (Whitehurst & Lonigan, 1998). Advisory Board members have observed that students' self-perception of their reading ability relative to their peers' tends to be accurate (i.e., students are good judges of how they are performing). Thus, reading skill and reader identity need to be supported in tandem; it will only be possible to increase reader self-efficacy to a small degree without actually improving reading skills. (Notably, however, perception of reading skill relative to school peers may be a poor indicator of objective reading skill on a larger scale.) Educators can provide students with reading materials appropriate to their skills and likely to inspire their interest and curiosity, help them build connections between reading materials and their lives, affirm their identity in scholarly spaces,

and bring to light the role that improved literacy can play in their life. To engage students in these ways, teachers need training in these practices (See Learning 4d) to build their pedagogical skill and their self-efficacy as an educator.

b. Building readers, identity, and reader identity

Research and reports from our expert educator advisory board members suggest that students' beliefs about their reading abilities are more amenable to change when students are younger (Shell, Colvin & Brunning, 1995). Thus, not only is early literacy intervention important in terms of supporting phonological awareness and the development of basic reading skills (See Learning 4b), but also it is helpful for supporting social emotional and identity components of reading development. These interventions are especially important for students from low-SES circumstances who may believe that their academic abilities are more fixed (Destin et al., 2019).

Still, intervention with older students is possible and important (See learning 4c). Adolescents' literacy skills can be better supported by helping them build abstract narratives about their own lives and social world happenings; this is not done often enough in high school even though teenagers are naturally inclined to build meaning (Immordino-Yang and Knecht, 2020). Though identity—our multi-dimensional, ever-present understanding of the self—is constantly evolving in response to social and cultural realities (Holland, 1998; Osher et al., 2020), during adolescence, the question, “who am I?” comes to the fore. Language and literacy play a significant role in helping youth develop an answer to that question (O’Shea, McKenna, & Thomson, 2019).

In racial minority children (particularly Black, Latinx, and Native American students), there is often an incongruence between their individual/cultural identities and the school identity they assume, which affects school engagement and outcomes. For example, in American schools, writing is the main avenue for self-expression—but for Native American and African American children, some more desirable forms of expression that are consistent with their heritage and culture may include storytelling, dance, or music (Cleary, 2008; Gardner-Neblett, Pungello, & Iruka, 2012; White-Kaulaity, 2007). The disconnect between literacy practices at home and in the community versus in the classroom presents an unnecessary barrier that primarily affects students from racial and ethnic minority groups that have been historically ignored in the design of school. Before students can be expected to learn to write, they need to learn the purpose of writing for themselves and their lives. When reading and writing are linked to modes of expression that students enjoy and know—so that they can understand their purpose—the students will be better prepared to learn to read and write. To bridge cultural gaps, students need encouragement and opportunity to engage in literacy practices in ways that are culturally and personally meaningful. The [Bridging Cultures Project](#), for example, supports teachers in using cultural knowledge to increase the educational success of their students, most of whom are Latino/a immigrants. Similarly, supplemental curricula have been designed to support Native American youths' literacy by having community elders engage students in storytelling (Costantino & Hurtado, 2006). (See also the practices of AINE described in Learning 2).

The processes of learning, building identity, and building relationships are not separate. Social categorizations such as class, gender, race, and disability create overlapping systems of power and privilege that shape how individuals experience the world. Identity is built by an individual, in relationships, within these cultural contexts. Literature is among the most powerful cultural forces that young people can use to guide their process of building identity because they are able to imagine possible personas as they slide into the lives of those others on the page.

Students, especially during adolescence, need to feel safe and secure in their relationships with peers and teachers to be able to engage in school and feel comfortable living out the identity they are coming to understand for themselves. Acclaimed author Sandra Cisneros (1984) wrote, “you want to know why I quit school? Because I didn’t have nice clothes. No clothes, but I had brains,” (p. 91). It may sound frivolous to quit school because of a lack of nice clothes, but this reflects the deeper reality that when students do not feel like they belong in school, feel shame about their self-expression, or cannot express themselves as they see fit, they may disengage from school to live in a way that feels more authentic (Kim & Suárez-Orozco, 2014).

Given the importance of identity in becoming a reader and the key role of reading in schooling, the effects of activating identity-based, reading-relevant stereotypes on students’ academic performance have been studied extensively for the last quarter of a century (Steele & Aronson, 1995). It is one of the few points of intersection that currently exists in the literature around reading skill and social-emotional experiences. Motivation for reading and, to a lesser extent, reading anxiety, are other notable points of intersection (e.g., Guthrie et al., 1999; Ramirez et al., 2019). Indeed, two advisory board members mentioned stereotype threat effects as an example of work at this intersection. It is important to note that the magnitude of stereotype threat effects is relatively small, and that more progress in building students’ literacy skill and identity as readers is possible when we conceive of identity in a more holistic and less categorical way.

Individuals exist at the intersection of their identity, history, and experiences. Identity is not a group membership or category, but a self-conceptualization and affinity. Thus, the extent to which a Latino student “feels Latino,” for example, can affect their experience of cultural marginalization in school (Immordino-Yang & Gotlieb, 2017). Similarly, the salient aspects of an individual’s subjectively experienced identity impact how they experience being made aware of that aspect of identity. For example, emerging work that advisory board member Joanna Christodoulou discussed suggests that when schooling helps students with learning disabilities conceptualize those disabilities as a type of neurodivergence that comes with strengths to be celebrated, reminding students of their disabilities can paradoxically improve their academic performance; the opposite is true for learning disabled students who have come through more standard schooling, and understand their learning disability as a shortcoming.

Interventions targeted at improving reading outcomes in children with learning disabilities succeed when they increase feelings of self-efficacy and motivation (Torgesen, Boardman, & Scammacca, 2008; Haft et al., 2016; Lovett et al., 2021). Related, Haft and colleagues (2019) showed the importance of social support and promoting a positive sense of identity through peer mentorship programs for such students. They found that depressive symptoms decreased and self-esteem increased in children with learning disabilities/ADHD who were paired with a peer

mentor. An excellent example is Project Eye-to-Eye (mentioned also in Learning 3). Project Eye-to-Eye improves self-efficacy, promotes identity formation, and motivates children to succeed socially and academically by focusing on the unique strengths and experiences of individuals who learn differently. Project Eye-to-Eye works with youth across the country, including in communities with high proportions of youth of color.

c. Future directions

Although the role of self-efficacy in learning has been studied extensively (Zimmerman, 2000), it is time to reinvestigate and interpret it for today's youth. *We suggest that future research explores what self-efficacy is in a modern context and how it intersects with literacy.*

Questions that might deepen this exploration include: How might the concept of self-efficacy be expanded or rethought to better accommodate recent sociocultural changes and the cultural assets of youth of color and those living in poverty? How are self-efficacy, a reader's identity, and reading outcomes related? Why might relationships among these matter for addressing the American reading crisis? How might this relationship change across the process of learning to read? How might it change with psychosocial development? In what ways are self-efficacy, motivation, engagement, grit, and growth mindsets related? How might these SEL capacities be synergistic, and how might they work together to promote curiosity and purpose? How are the aforementioned potentially inherently biased? What groups of characteristics or qualities of texts and literacy curricula promote self-efficacy for students of color and those experiencing poverty? How do these vary across subgroups, developmental stages, and reading abilities? In what ways do youth of color and those living in poverty demonstrate and build self-efficacy in diverse, literacy-relevant contexts? How do expert teachers leverage students' self-efficacy and reader's identity to support reading development across the process of learning to read? How do self-efficacy, motivation, engagement, grit, and growth mindsets manifest in similar or different ways? How do they manifest differently among students?

7. There is a complex system of inequities—especially race/ethnic-based inequities—around the identification for and the timing and quality of remediation within standard and special education. This is a result of structural and systemic bias in educational systems as well as misunderstanding of the neuropsychological process of reading development.

a. Disproportionality in special education

Many students are impacted by special education, and special education specifically plays a major role in supporting literacy development for millions of students. Last year, more than 14% of all public-school students (and as many as 20% of students in some states) received special education services under the Federal Individuals with Disabilities in Education Act (IDEA), and the percentage of students served by special education has been on the rise for the past decade (NCES, 2021). About one-third of these students who received special education were designated as having specific learning disabilities, and reading disabilities were the most common (NCES, 2021). The categorization in schools of students as having learning disabilities has been used as a way for general education programs not to have to teach students whom they

find difficult to reach (Lyon et al., 2001). Indeed, as Erin Whalen and Mary Shimazaki emphasized, the way these students are treated in school has implications for their possible involvement in the juvenile justice system (Kim et al., 2021). Given the influence of special education on literacy development and the half century of legal battles about disproportionality in special education (e.g., *Larry P. v. Wilson Riles, 1972*), it is important—in the context of closing literacy gaps—to understand who is placed into special education.

Students from low-SES backgrounds are more likely to be placed into special education than higher-SES students (Artiles et al., 2005; Blair & Scott, 2002) and school district SES intersects with students' race and gender to compound disproportionate identification in special education (Coutinho, Oswald & Best, 2002). Black, Latinx, and Native American students are more likely than White students to be in special education (NCES, 2021; Sullivan & Bal, 2013), while Asian students are less likely to be in special education (Skiba et al., 2008; Sullivan & Bal, 2013). However, once confounding variables like academic achievement are controlled for, Black and Hispanic students are actually placed in special education less frequently (Morgan et al., 2015; Morgan et al., 2017). Moreover, when determining who is at risk for being placed in special education, the overall racial makeup of a student's school matters in addition to individual student race and ethnicity. For instance, schools with a higher percentage of minority students and schools with more struggling readers are less likely to place students in special education (Hibel, Farkas & Morgan, 2010; Odegard et al., 2020).

Overrepresentation in special education is better understood as it intersects with broader inequities and injustices in education and society, including racism, segregation, and poverty (Blanchett et al., 2009). Disability theory suggests that “disabling” individuals by quantifying how they differ from the norm is unnecessary and even dehumanizing (Annamma, Connor & Ferri, 2013; Davis, 2016). We must be cautious when labeling students as having disabilities, given that these labels carry assumptions about what it means to be “normal.” The reference group that “normal” is based on—and the extent to which that group is appropriate—is a challenging and evolving issue (See also Learning 4d). Some have argued that schools should not identify students for special education based on perceived risk factors that educators are biased to perceive more harshly for youth of color (O'Connor & Fernandez, 2006). Current systems for special education referral and placement may disproportionately document minority students as disabled by comparing students to white middle-class peers as a referent on tests that were developed for white middle-class students—a decision rooted in historical and systematic racial biases.

b. The double-edged sword of labels

Although labels like “specific learning disability” run the risk of stigmatizing students, there can also be benefits to labels (see Lauchlan & Boyle, 2007). For instance, labeling students with disabilities is currently the most efficient way to ensure that students' specialized educational services are funded and implemented. Classification in special education can result in funding for evidence-based practices not available in general education, which allows students to access curriculum and meet educational goals that are individualized to their learning. Learning disability labels can also empower students by offering them a schema through which they can

come to better understand their profile of strengths and weaknesses as a learner. Many people with dyslexia go on to be very successful, and the ones who do are typically the ones who have insight into their areas of strength and passion (an idea advisory board member Joanna Christodoulou mentioned), and develop self-efficacy around this. Thus, facilitating this self-understanding can be very beneficial.

c. Future research and improved implementation to address disproportionality

Thus, future work should focus on developing more sensitive and less biased ways to consider the role of student demographic characteristics in special education placement relative to literacy. One component of this involves the development of new, less culturally biased tools for reading and language assessment. Another approach involves ensuring that educators understand—and that teacher preparation programs teach about—the history, politics, and ongoing social dynamics around inequality in America and its classrooms. This has become even more important as teachers are increasingly asked to fix the pernicious problems of poverty and racism. Teacher education may help educators understand their own positionality and the way it affects their practices, so that they can better see students’ diverse assets and funds of knowledge and reduce their biases in the referral process. Given that the teacher workforce—especially the special education teacher workforce—is disproportionately white (83.5% of all special education teachers identify as white; NECS, 2020), this work to understand the role of race in our classrooms and in educators’ own lives is especially important. Equally important is supporting educators in understanding the science of reading (see Learning 5) and of reading disabilities, so that they are equipped to identify early indicators of reading challenge and so that they understand the dynamic and contextual nature of reading disabilities.

Well-implemented Response to Intervention (RTI) programs have shown promise for reducing disproportionality in special education (VanDerHeyden et al., 2007). These programs provide universal instruction with a strong evidence base which can ameliorate environmental (e.g., SES-based) risk factors for learning. Further, using data and objective observations, students can be identified for additional support to target gaps. As these gaps are remediated, students should also have access to the general education curriculum and be able to exit from special education in a timely fashion. Within a good RTI program, some struggling students will no longer need special education services, especially if these interventions take place in early elementary school and are coordinated with effective screening (See Learning 4; Lovett et al., 2017).

Other work should focus on improving special education services by emphasizing the use of evidence-based practices in systemic ways that result in student gains (Cook, Smith, & Tankersley, 2012). As mentioned above (Learning 5), multi-component literacy programs, such as RAVE-O and Empower, have been shown to be efficacious across different settings in improving reading skills across race, ethnicity, and SES (Lovett et al., 2017; Wolf et al., 2009). A consideration schools should examine is the practicality of providing evidence-based programs at the frequency that leads to gains. Another area for investment is high-leverage practices (McLeskey et al., 2017) in special education. These guidelines are research-based and outline specific ways special educators should collaborate, instruct, assess, and support social, emotional, and behavioral development.

Finally, given comorbidities between reading disabilities and attentional issues, anxiety, depression, and other psychiatric conditions (Goldston et al., 2007; Hendren et al., 2018; Nelson & Harwood, 2011) as well as the contributions of poverty and trauma (including racial trauma) to both reading and mental health challenges, future efforts should attempt to provide academic and social-emotional (including mental health) supports in tandem. This should also include a sensitivity to environmental influences on students' experiences with reading disabilities and socio-affective challenges. Advisory board member Nadine Gaab suggested that it could be productive to screen for learning disabilities and social-emotional issues simultaneously, though she also expressed that coordinated research linking these facets of development does not yet exist and should be conducted.

Inspired by our learnings here and above (see Learnings 2, 4, and 6), we recommend that future research addresses how we can harness the power of culturally responsive pedagogy to address special education inequities and to improve reading instruction and literacy outcomes. Researchers might consider how educational assessments might be designed to be less culturally biased, more asset-based, and focused on measuring reading as a tool for supporting broader socio-cognitive development. How can we measure literacy as it occurs in authentic contexts in diverse communities? How might developmental neuropsychological work afford insights into effective ways to support students of color, students living in poverty, students with reading challenges like dyslexia, and English Language Learners?

8. Technological advances represent both a tremendous aid and a possible liability to the development of literacy and literacy self-efficacy among underprivileged and marginalized youth. Technology greatly aids the spread of ideas, creating access to information for more people (including people living in poverty and with disabilities) and creating a culture in which individuals read more words than ever before. However, technology privileges a particular type of reading that is fast and well-suited for superficial engagement with large volumes of information. Reading is essential for the development of skills important for individuals and democracy, such as critical thinking, empathy, background knowledge and others. However, reading that supports such skill development is generally slower and more in-depth. Print, more than digital, facilitates time-demanding reading and deep understanding, though digital reading can have a role to play.

For many years, digital technology's impact on society and youth development has been increasing, but the impact of technology on society and children has, perhaps, never been more pronounced than during mass quarantining in response to COVID-19. Children across America relied on a digital device as their only connection to school and classmates during months of the global pandemic, and use of such devices for connecting increased (Brown & Greenfield, 2021). Reading instruction varied substantially during COVID-19 lockdowns, in part due to technological constraints (Chamberlain et al., 2021). Presently, there is great uncertainty around our evolving relationship with technology and the role of technology in schools, given the potential for a seismic shift in these dynamics as a result of our technological dependence during quarantines. Our expert educator Advisory Board members described many open questions

around the role of technology in students' lives and brain development as we reflect on the way this pandemic has changed us.

What we know about the role of technology in youth development and well-being to date is complicated (James et al., 2017). [Common Sense Media](#) provides parents, educators, health organizations, and policymakers with sound data and analyses regarding children's use of media and technology, as well as the impact of media and technology on physical, emotional, social, and intellectual development. In the midst of the COVID-19 pandemic, young adults reported that, when experiencing depressive symptoms, they were likely to seek out support using digital mental health tools. They also noted alleviation of anxiety symptoms related to the use of social media (Rideout et al., 2021). However, others have suggested primarily adverse effects of smartphones, social media, and other technology use on adolescent identity development, affect, mental health, social connectedness, empathy, attention, and socio-cognitive reflective capacities (e.g., Gardner & Davis, 2013; Immordino-Yang, Christodoulou & Singh, 2012; Steiner-Adair & Barker, 2013; Twenge, Martin & Campbell, 2018).

Similarly, the relationship between digital technology and literacy development is mixed (Wolf, Ullman-Shade & Gottwald, 2012). Technology greatly aids the spread of ideas, creating access to information for more people and creating a culture in which individuals read more words than ever before. Technology opens new and exciting possibilities for students to engage more easily in non-reading-based aspects of literacy practices (e.g., sharing oral stories widely). Educators need to be discerning in selecting educational digital applications that might provide educational value (Hirsh-Pasek et al., 2015), a point advisory board member Nadine Gaab strongly emphasized. Still, there are many emerging educational technologies that have shown varying degrees of success in supporting students' reading outcomes, especially when paired with teacher support (Cheung & Slavin, 2012). For example, [Achieve3000](#) is a supplemental computer-based reading program specifically designed for diverse student groups, including ELLs. There is a small amount of evidence attributing gains in literacy to this intervention (Hill & Lenard, 2016). This program provides differentiated instruction that can be done autonomously. In addition to intervention programs, AI supported literacy programs such as [RallyReader](#) use digital technology to provide responsive feedback and instruction to support reading fluency. Programs such as ReadLive can support both fluency and comprehension through a digital platform. These programs offer something that many paper-based programs do not: ease and flexibility for the user in home or school settings. Because these programs can be implemented with a range of abilities in reading classes, there is potential for digital literacy tools to provide an important supplement to literacy instruction. Additionally, gamification elements can make them especially engaging. However, caution is merited; learning to read is a social act that cannot proceed without support and guidance from adults, and it is a complex undertaking that could be undermined by too many reading-irrelevant game elements.

Despite these positive possibilities, there is also substantial room for concern about the role of technology in literacy and reading development. Electronic features in children's story books have been shown to impair kids' understanding (Parish-Morris et al., 2013). Numerous experts from across medicine and education have urged against all use of electronics among youth under 2 years old for the sake of protecting healthy cognitive and visual development (Steiner-Adair &

Barker, 2013). A recent meta-analysis (Delgado et al, 2018) presented findings indicating that reading comprehension skills are favorably developed through paper-based reading, as opposed to digital mediums. This may be in part because the self-regulatory capacities required of students to monitor their reading when accessing digital text are not yet fully developed. On time bound tasks, it was found that processing digital text took longer than paper text. Despite a preference for reading on screens, Golan, Barzillai, and Katzir (2018) found that students' comprehension and reading behaviors were stronger in print reading as opposed to digital. In addition to potential detriments of digital reading in early literacy development, even adults who have fully mastered the decoding aspects of reading may suffer detriments to their literacy when relying too heavily on online sources. Specifically, "fake news" has abounded online because individuals are fed information that has been curated to appeal to them—regardless of its truth value—and they are more likely to engage with these sources only superficially so that they are not good judges of the veracity of the information (Wolf, 2018). As suggested in Learning 1, this can pose a threat to the strength of our democracy. Measures that assess time on screen, such as ScreenQ, can be an important tool to help mitigate potentially harmful effects of too much time with technologies on literacy and social-emotional well-being (Hutton et al., 2020).

We must also consider the intersection of technology's limitations and affordances with equity concerns for people of color, those with disabilities, or those experiencing low-SES. While the internet has been lauded as the great democratizer of information, the extent to which this is true is limited by lack of access to an internet connection. There are inequities in young people's access to computers and the internet, especially as a function of SES and urbanicity. During COVID-19 quarantines, these inequities in technology access exacerbated existing educational inequities. There are also gender and race/ethnicity-based differences in the social-emotional risks of social media to youth. For example, more time spent online has been associated with more online and offline bullying and racial discrimination for racial-ethnic minority adolescents (Weinstein, Jensen & Tynes, 2021).

On the other hand, technologies can be leveraged to reduce inequities. New technologies, including social media and multimedia books, may provide some unique reading and social-emotional benefits for underserved populations such as English Language Learners (Li et al., 2015) and students at risk for reading or language-based challenges (Bus, Takacs & Kegel, 2015; Verhallen, Bus & de Jong, 2006). Organizations and schools that serve large proportions of people with disabilities like [CAST](#), [Perkins School for the Blind](#), [International Dyslexia Association](#), [Landmark College](#), [Bridges Academy](#), and [Albuquerque Sign Language Academy](#) can also attest to the power of technology in supporting universal design for learning, and thereby in creating more accessible and equitable learning environments.

Literacy is critically important to the health of our democracy, society, and economy (Learning 1). Technology is changing adults' and youths' literacy engagement in ways that are critical to understand in order to maintain and strengthen our democratic, civil society (Wolf, 2018). As society becomes more dependent on technology, print retains an important role in deep reading for comprehension. With digital reading we tend to skim, and typically do not think or feel deeply about the text. It may be that reading this way too much can cause our abilities to think and feel deeply in other contexts to atrophy. With print-based reading, we have a bigger

possibility of reading deeply, allowing us to take in perspectives and critically analyze (Wolf, 2018). Advisory Board member Maryanne Wolf (2018) has said, “Deep reading is always about *connection*: connecting what we know to what we read, what we read to what we feel, what we feel to what we think, and how we think to how we live out our lives in a connected world.” She argues that part of a 21st century literacy curriculum should be teaching students that there are distinct ways of reading print versus digital information. Further, print and digital reading each have advantages and disadvantages, and knowing when to read in print or digital formats is important so that our critically important deep reading skills can develop. Students can be taught to self-monitor their reading habits, keeping track of their time on screens and the purpose of that time, with a goal of having students choose print for deeper comprehension and digital text for access to a breadth of information.

Future work

Given the complexities around the role of technology in literacy development, we encourage further exploration into how we harness the power of digital media and curriculum design to improve reading instruction and literacy outcomes for our target populations. How might educational curricula and tools be designed to be less culturally biased, more asset-based, and focused on supporting reading along with broader socio-cognitive brain development? What groups of characteristics or qualities of digital and print texts and literacy curricula promote self-efficacy for students of color and those experiencing poverty, and which undermine it? How do these vary across subgroups, developmental stages, and reading abilities? How might schools and product developers create opportunities for diverse young people to develop print-based and digital literacy skills—and literacy self-efficacy—in parallel? How might educational curricula and tools be implemented in the classroom in a way that avoids cultural bias and focuses on supporting reading along with broader socio-cognitive development? Such work will benefit from being conducted by teams with diverse perspectives and expertise—e.g., educational practitioners and educational, developmental, and neuropsychological researchers.

Concluding Remarks

The intersection of literacy development and social-emotional development is ripe for additional research that could have important implications for improving literacy education because literacy is fundamentally a social, emotional, relational, and cultural act. We are in the midst of a literacy crisis in which we have forsaken far too many of our children, especially our youth of color and youth from under-resourced communities. Literacy is a critical bridge to effective and productive participation in society, and to self and community advocacy for individuals in our target populations. We need dramatic action to better support these youth and the teachers whom we entrust with the tremendous responsibility of educating them.

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