The Science of Summit

Preface

In pursuit of true equity and opportunity

The majority of schools in America do not create the conditions to nurture the talents of every child, especially those whom systemic racial and socioeconomic inequities have failed. While this may not be the intent of those operating the schools today, it is the reality cast in the long shadow of history. That leaves us but one question: What do we do about it?

Fifteen years ago, we founded Summit Public Schools to be a place where all means all — a place intentionally designed to serve and embrace every individual child in a richly diverse community. We did so with an awareness of the forces pulling against our mission: poverty, racism, sexism, and discrimination against those with disabilities.

Today, those forces seem only to have grown in strength and magnitude. At Summit, the vast majority of our graduates have the opportunity of college, but that is not good enough — a fact that is simultaneously true and painful.

We know but one way to improve, and that is through brutal honesty and transparency to invite feedback and collaboration.

And so, we are deeply curious and eager to know what you think. What are we getting right? What are we missing? What don't we know? Who can we learn from? How can we get better?

I invite you to comment, but more importantly, I invite you to engage. We seek authentic collaboration with all those who are committed to valuing each and every child, seeing them as individual human beings worthy of all the love, compassion and dignity we give our own children.

Diane Tavenner
Chief Executive Officer, Summit Public Schools

Introduction

Letter from the Chief Academic Officer

I hope that you have arrived at this paper both as a learner and as a teacher. Certainly that is the spirit in which we wrote it.

The Science of Summit **is our effort to share what we believe about young people, about the promise of public education, and about principles for school design rooted in the science of learning.** It is also a work in progress. Though our Summit Learning approach rests on foundations of research, an unwavering belief in all children, our experience as teachers and principals, and the ideas of renowned thinkers (John Dewey, the leading educational thinker of his time, called for a "science of education" in 1929), it continues to be renewed, improved, and animated in schools across the country.

In our young people, we have reason for great hope. I've never been more hopeful that networks of parents, educators, community leaders, researchers, technologists, policymakers, advocates, content creators, workplace leaders, and — most importantly — students can work together to build great schools. I've never been more hopeful that teaching can be a collaborative pursuit focused on equitably supporting all learners. I've never been more hopeful that the barriers preventing theory from informing practice — and conversely, practice informing theory — are shaking and crumbling under the force of an increasingly vocal community of teachers, school leaders, and academics across fields who care, first and foremost, about empowering children to make meaningful, positive change in their communities.

There is little debate that today's children are growing up in a rapidly changing world. It's up to us make sure that our schools keep pace. Like Dewey, we don't believe that change will happen in a laboratory, under ideal conditions. We have to work within our local communities to build the schools our students deserve, schools that empower all students with the skills, knowledge, habits, and purpose that equip them to lead a fulfilled life.

What will endure from this paper is the framework we use to create coherent, purpose-driven schools. It is a framework I hope will help others articulate school designs that translate the science of learning into the practice of schooling.

Finally, I would like to thank the giants upon whose shoulders we stand, as well as those who have walked courageously with us. World-class researchers including Todd Rose, Angela Duckworth, Todd Rogers, Camille Farrington, David Yeager, Brooke Stafford-Brizard, Pamela Cantor, Melina Uncapher, and Chris Hulleman have been generous with their time and expertise. These researchers have spent hours with us offering wisdom, feedback, and creative problem-solving solely in the interest of better serving students.

Thank you to our Summit teachers, school leaders, and families, and to our Summit Learning schools, who are making everything you'll read about in The Science of Summit their own. The real success stories and innovations are theirs.

Thanks to the amazing research partners who have helped us improve: the Stanford Center for Assessment, Learning, and Equity; SRI; FSG; the Center for Public Research and Leadership; Transcend Education; Lindsay Unified School District; the National Equity Project; Bellwether Partners; the California Performance Assessment Collaborative; the Character Lab; Next Generation Learning Challenges; the Carnegie Center for the Advancement of Teaching; and so many other learning partners have challenged us, inspired us, created with us, and informed our work.

Thanks also to the team who contributed to the writing and revision of this paper: Dalia Hochman, Mira Browne, Diane Tavenner, Erica Swallow, Manisha Shah, Catherine Madden, Allison Wachtel, Katie McNeil, Lauren Faggella, Donna Park, Emily MacNeil, Joe Bielecki, Ross Lipstein, and Caroline Hill.

This paper is the beginning of our effort to highlight cross-disciplinary theory in practice. It is also an invitation to collaborate with us, to learn with us, and to teach us. Please use the ideas in this document to serve your community, and please join us on this journey to support all students.

With great respect,

Adam Carter
Chief Academic Officer, Summit Public Schools

The Purpose of This Publication

The Science of Summit is the first of several publications we plan to release over the coming year that will provide additional details on elements of our framework.

This publication reviews the research underlying the evidence-based principles and educator design choices we have made at Summit Public Schools. Future publications will describe Summit Learning design choices and adaptations in local communities across the country.

Over the past 25 years, scientists have made dramatic advances in the neurological underpinnings of learning. The burgeoning field of learning science brings exciting advances in neuroscience, social psychology, cognitive development, and behavioral economics to the field of education. **We have derived insights from education research across the spectrum, from experimental studies in cognitive science to large-scale analyses of workforce readiness.** The most prominent national and international curriculum frameworks also inform our approach.

In *The Science of Summit*, we describe how:

- The importance of students developing **Cognitive Skills** is universally supported by multiple prominent curriculum frameworks. Cognitive Skills equip students with interdisciplinary 21st century competencies to navigate college and careers. (National Research Council, 2012; Conley, 2012; Center for Curriculum Reform, 2015; Partnership for 21st Century Skills, 2016).

- Students must acquire and retain key **Content Knowledge** to support the development of Cognitive Skills (Willingham, 2009; Schwartz, Tsang & Blair, 2016). To meet the needs of all learners, students should advance through material at their own pace and with appropriate supports and move on only when they demonstrate proficiency in a given subject (AIR, 2016; Rose, 2016).
- Social-emotional learning is inextricably linked to academic learning. To succeed, students need **Habits of Success** — a set of skills, mindsets, dispositions and behaviors that develop along a continuum and that are grounded in the social nature of learning (Farrington, 2012; Stafford-Brizard, 2016; AIR, 2017).
- Students who cultivate a **Sense of Purpose** are more likely to succeed in meeting their short- and long-term goals (Damon, 2008; Yeager, 2014; Seligman et al., 2013). Upon high school graduation, students need to possess an understanding of their interests, values, and skills; they also need to construct a credible path after high school for translating those interests, values, and skills into fulfilled lives.

The paper is organized into four chapters, each devoted to a discussion of our Summit Learning Outcomes. For each outcome, we:

- **Define** the outcome;
- **Share** the research underlying the outcome;
- **Illustrate** the evidence-based principles and educator design choices related to the outcome;
- **Discuss** what we have learned about the outcome over time;
- **Pose** open questions we have about the outcome; and
- **Recommend** resources for further learning.

Educational research is interdisciplinary by nature, drawing on diverse fields including cognitive and social psychology, neuroscience, human development, economics, and sociology. Research on workforce development and 21st century skills provides additional guidance on the competencies needed for students to succeed in a rapidly evolving economy.

While we embrace the new, we also stand on the shoulder of giants, continuing to gain inspiration from the greatest thinkers in education such as John Dewey, Paulo Freire, Grant Wiggins, and Linda Darling-Hammond, among others.

In the pages that follow, we share the research insights that have proven most influential in the development of Summit Learning with the caveat that our thinking continues to evolve each day. We remain open to (and hungry for) new ideas and new insights that challenge our thinking. **We see this document, therefore, as a living document that will change and grow as the field of educational research continues to expand.**

Publication of *The Science of Summit* is evidence of our commitment to transparency. Summit believes that one of our primary purposes as a leader in education is to **share our work openly with the education community.** The research in The Science of Summit formed the foundation of our successful approach to learning. Our hope is that the same research will inform education policy and school design moving forward.

The Aligned School Model Framework

Educational institutions deliver the outcomes they are designed to produce. The beliefs that decision-makers hold about human potential directly impact how an education system is set up and, consequently, the outcomes that all children are able to attain. Additionally, the values of a given society, coupled with economic realities, will dictate a specific purpose of education.

Educators can translate such a purpose of education into a clear set of desired student outcomes, evidence-based principles, and educator design choices. Student assessment and program evaluation data measure individual progress and provide important feedback to educators. Such a framework exists on both the micro and macro levels, for an individual school as well as for an entire system of education.

Our current American public education system is based on a specific set of values, beliefs, economic needs, and cultural forces of the 20th century Progressive Era school reformers. The reformers carefully designed a system that would produce a skilled workforce for industrial America, preparing the majority of students for factory jobs and a minority to become managers and elites. Underlying the industrial model was a very specific belief system about the capacities of different groups of students to succeed.

We are living in a post-industrial age, but our public education system still reflects the careful design of an earlier era.

Summit Public Schools, a leading public school system in California and Washington State,

and its personalized approach to teaching and learning, Summit Learning, represent an alternative to the industrial model of education. The designs we describe here are based on recent advances in the science of learning: new research that helps us better understand how children develop, how they become learners, and how their environments can nourish or hinder their progress.

We are but one voice in the current innovation landscape in American education. In the pages that follow, we outline our design, both at a school and a system level. After an introduction to our approach, this paper focuses primarily on the research underlying it. Future publications will describe other elements of our framework in more detail.

Eight Steps for Designing an Aligned School Model

The *Aligned School Model Framework* is used to articulate a school model that consistently and reliably predicts success for all students when implemented effectively — one that is aligned with the school's articulated purpose of education and grounded in evidence.

1. Articulate local and global realities	What local and global realities impact your community?
2. Express community values	What does your community value most? What beliefs and ideals do you want to transmit to the next generation? What

	assumptions does your community hold about people as learners?
3. Define the purpose of education	Given local and global realities, along with your community's specific values, what should be the goal of education?
4. Determine measurable outcomes	What skills, knowledge, and habits should all students demonstrate in order to reach the goals you have set? Do the outcomes reflect high expectations for all while respecting individual differences?
5. Identify evidence-based principles	What principles, derived from learning science and human development research, align with the outcomes you have determined and the purpose you have defined?
6. Describe teaching and learning environments	How do your scientific principles translate into instructional practice? What design choices will or do you make about curriculum, teacher and learner roles, assessment, professional development, and other elements of the school environment?
7. Create the handbook	Provide clearly documented and accessible materials for teachers, parents, students, and other stakeholders to understand their role in the school model. Ensure data is used for continuous improvement.
8. Assess alignment and coherence of model	Is the school model aligned from steps one through seven, and does it represent a coherent hypothesis for how to consistently and reliably enable the expected student outcomes for all students?

Our Values and the Purpose of Education

In 2003, we opened our flagship school, Summit Preparatory Charter High School, with the belief that every child should graduate from high school equipped with the skills, knowledge, and habits to lead a fulfilled life; one that is filled with choice, financial independence, community engagement, strong relationships, and health. We believe that for adults to thrive and live such a life, they need to have a Sense of Purpose, which involves self-knowledge, the ability to set and meet goals, and the critical skill of persisting in the face of inevitable challenges.

We believe that students from all backgrounds, nationalities, ethnicities, races, and sexes have the same potential for success. We also believe in, and celebrate, the individual differences young people bring to an educational environment; learners vary in the pace at which they learn, in the subjects and topics they find interesting, and in the types of materials that they find engaging. We believe in the principles of restorative justice as a way to build a community and an academic culture. We believe that education can be the most powerful mechanism of social change.

We also hold a set of beliefs around key partners in the educational process; namely, teachers and families. We believe that we must position teachers for success with sufficient support, time, tools, and learning opportunities. We believe that parents and guardians are critical partners in ensuring each student's success.

Measuring Student Outcomes

To put our beliefs into practice, we must clearly define desired student outcomes. Students and their families want to understand the long-term outcomes of a Summit Learning education. A set of achievable goals actualizes our beliefs about human potential and helps measure our progress along the way.

After a careful review of the most prominent competency and curriculum frameworks, four student learning outcomes have emerged. **A Summit graduate will leave our doors only after demonstrating mastery in the following four domains:**

- **Cognitive Skills:** Interdisciplinary, higher-order thinking skills
- **Content Knowledge:** Rigorous content across all academic subjects
- **Habits of Success:** Behaviors, mindsets, and dispositions
- **Sense of Purpose:** Self-knowledge, values, relationships, and a credible path

Student Assessment and Program Evaluation

Because our student learning outcomes depart from those of a traditional school, traditional assessments cannot provide us with accurate, reliable, and valid data on how our students are progressing and how to improve our model. To fill that void, we have developed our own internal assessment system with the help of researchers at Stanford University. We have created a Cognitive Skills Rubric and a set of assessments for Content Knowledge, and we are in the early stages of developing assessments for social-emotional learning and student purpose. Assessment data provides critical information for students, teachers, and families. It also helps us improve as an organization.

Evidence-Based Principles

Based on these desired student outcomes, we have designed an instructional approach that would best support students as they developed proficiency in the four domains described above. We have consulted the most up-to-date literature in the fields of learning science, psychology, and workforce development and engaged well-reputed research firms to help us define our approach. The result is a set of principles on how students learn best. All of our learning principles are deeply rooted in rigorous scientific evidence.

Educator Design Choices

Our deeply-held beliefs about the potential of all students, as well as our careful review of recent advances in the science of learning, motivated us to design a new type of school. We developed

new approaches, learned quickly from what worked and what didn't work, and joined multiple networks of innovative educators in order to learn from colleagues across the country and the world. We designed an instructional approach that is competency-based and focused on student learning, rather than on student seat time. We use project-based learning to develop a set of interdisciplinary, higher-order Cognitive Skills that are critical to success in the 21st century. We prioritize the development of social-emotional learning, which we call Habits of Success.

We also designed a fairly radical school calendar that includes eight weeks of student Expeditions each year so that students have an opportunity to delve deeply into a subject of interest or pursue an off-campus internship. We pair each student with a long-term, 1:1 mentor who monitors and supports their academic, social, and emotional development. And we built a customized Summit Learning Platform that houses our curriculum and serves as the organizing tool behind our approach.

Sharing What We've Learned

In 2013, we started to hear from colleagues across the country who shared our beliefs and desired the same outcomes for their own students. Many of our instructional designs, such as project-based learning and weekly mentoring, deeply resonated with fellow educators. In response to the growing demand, we started to collectively consider how other communities could adapt our approach to meet their local needs. Local values, culture, and context matter. There are very few comprehensive "off-the-shelf" solutions in education.

The result — the Summit Learning Program — offers all schools across the country the opportunity to implement Summit Learning and adapt it to their communities, with free support and resources from Summit Public Schools. Summit Learning schools share many of our beliefs, our student outcomes, our evidence-based principles, and some of our design choices. Summit Learning schools also bring their own additional design choices to their approach, creating a hybrid of a local-national framework. The relationship is bidirectional; we learn as much from our partners and they learn from us.

The Summit Learning Program continues to grow and will include approximately 330 schools, 2,450 teachers, and 54,230 students in 40 states in the 2017–18 school year. **Each year, we hear from additional schools eager to participate in the Program. We are humbled to learn from colleagues across the country and the world.**

A History of Summit

2003	Summit Public Schools founded. Focuses on understanding individual student goals and impact of strong mentor relationships
2007	Graduates first class, with 96% of students accepted into at least one four-year college
2011–12	Celebrates inaugural class's completion of four years in college — 55% on track to complete college in six years (two times the national average)

	Launches first blended learning math pilot with Khan Academy in two Summit schools
2012–13	Expands piloting to focus on Habits of Success and self-directed learning Hones personalized approach to teaching and learning, called Summit Learning
2013–14	Brings Summit Learning approach to all 2,000 students across Summit Public Schools
2014–15	Partners with Facebook to co-build the Summit Learning Platform to be shared with schools across the U.S. for free
2015–16	Partners with 19 schools to share personalized learning approach through the Summit Learning Program
2016–17	Welcomes 132 schools as partners in the Summit Learning Program, reaching 1,071 teachers and 20,275 students in 27 states Forms long-term engineering partnership with the Chan Zuckerberg Initiative to continue enhancing the Summit Learning Platform
2017–18	Grows Summit Learning Program to an approximated 330 schools, 2,450 teachers, and 54,230 students in 40 states

Relevant Frameworks and Standards

Summit is, first and foremost, an educational organization established to support all students by designing and operating excellent schools. The implementation of Summit Learning in diverse educational contexts across the United States has deepened our understanding of what all students need to succeed. While we are not a research firm, we do rely heavily on partnerships with the research community. Several research-based frameworks and curriculum standards have influenced our thinking in particular. We begin by acknowledging the influence of these frameworks on our design choices and the contribution they have made to the field of learning in general.

- **National Resource Council:** A 2012 National Research Council report entitled Education for Life and Work: Developing Transferable Knowledge in the 21st Century identified three domains of competence required for 21st Century Skills: cognitive, intrapersonal, and interpersonal.
- **EPIC:** *The Complete Definition of College and Career Readiness* from the Education Policy Improvement Center (EPIC) provides an important distinction among cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge and skills. (©2017 EdImagine/David Conley)

- **Center for Curriculum Redesign:** *Four-Dimensional Education: The Competencies Learners Need to Succeed* from the Center for Curriculum Redesign (CCR) differentiates among the following four dimensions: knowledge, skills, character, and meta-learning.
- **Partnership for 21st Century Skills:** The Partnership for 21st Century Skills (P21) has developed a Framework for 21st Century Learning that includes the four C's: Critical Thinking, Communication, Collaboration, and Creativity.
- **The California Center for College and Career:** Work from ConnectEd: The California Center for College and Career bridges the research on workforce development and job readiness with secondary education.

Other national curriculum frameworks, such as Common Core State Standards and Next Generation Science Standards, have informed our work.

Summit Learning Outcomes

Summit graduates demonstrate proficiency in the following four outcomes:

Cognitive Skills: Interdisciplinary, higher-order thinking skills	**Content Knowledge: Rigorous content across all academic subjects**	**Habits of Success: Behaviors, mindsets, and dispositions**	**Sense of Purpose: Self-knowledge, Values, relationships, and a credible path**
Upon graduation, students will achieve level 6 or higher on every skill on the Cognitive Skills rubric.	Upon graduation, students will pass all power focus areas.	Upon graduation, students will know and understand their strengths and areas for growth in Habits of Success.	Upon graduation, students will have a long-term plan rooted in their values and interests and a credible next step toward their long-term plan.

- **Cognitive Skills:** Interdisciplinary, higher-order thinking skills
- **Content Knowledge:** Rigorous content across all academic subjects
- **Habits of Success:** Behaviors, mindsets, and dispositions
- **Sense of Purpose:** Self-knowledge, values, relationships, and a credible path
- **Cognitive Skills:** Interdisciplinary, higher-order thinking skills

Cognitive Skills: Interdisciplinary, Higher-Order Thinking Skills

“Students need to do more than retain or apply information; they have to process and manipulate it, assemble and reassemble it, examine it, question it, look for patterns in it, organize it, and present it. They need intentional patterns of thinking to draw on as they complete work after high school.”

— David Conley, Education Policy Improvement Center

“Educational success is no longer about reproducing content knowledge, but about extrapolating from what we know and applying that knowledge to novel situations. Education today is much more about ways of thinking which involve creative and critical approaches to problem-solving and decision-making. It is also about ways of working, including communication and collaboration…”

— Andreas Schliecher, OECD Education Directorate

What are Cognitive Skills?

Cognitive Skills are interdisciplinary competencies that require higher-order thinking.[1] David Conley of the Education Policy Improvement Center (EPIC) calls these skills "cognitive strategies" and defines them as "ways of thinking necessary for college work."[2] The Center for Curriculum Redesign (CCR) suggests that these skills are "how we use what we know" and involve the four Cs: Creativity, Critical Thinking, Communication, and Collaboration (Fadel, Trilling & Bialik, 2015). Educational researcher David Perkins (2014) describes 21st century skills and dispositions as those that cultivate "critical and creative thinking, collaborative skills and dispositions, leadership, entrepreneurship, and related skills and dispositions that speak strongly to living and thriving in our era." **While the terminology differs across frameworks, there is universal agreement across the research community on the importance of students developing Cognitive Skills.**

What is the research behind the development of Cognitive Skills?

Summit's focus on Cognitive Skills is supported by the most prominent national and international frameworks that have been published over the past ten years describing the competencies required for college and career readiness. Both the Common Core State Standards (CCSS) as well as the Next Generation Science Standards (NGSS) emphasize the teaching and learning of Cognitive Skills. Both sets of standards were developed as a result of extensive research on the skills students need to be successful in college and careers (CCSS, 2010; NGSS, 2013). Well-respected competency frameworks from EPIC, P21, and CCR all prioritize the development of academic skills in addition to the acquisition of content knowledge.[3]

Evidence from cognitive science further supports an emphasis on the development of higher-order thinking skills. A hallmark of deep understanding is transfer, the ability to take an idea learned in one context and apply it to another. Researchers have found that educational experiences that require students to take an active role in their own learning and that emphasize communication and metacognition enable the process of transfer (De Corte, 2003). Summit's approach to cognitive skill development across grade levels and subject matter rests on the primacy of transfer to promote enduring learning.

It is important to note that the discussion of Cognitive Skills here reflects higher-order thinking skills on one end of a developmental continuum. Recent evidence in learning science suggests that the development of cognitive readiness is a pathway analogous to the development of other complex

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[1] The term "Cognitive Skills" comes from an influential report published by the National Research Council in 2012 entitled *Education for Life and Work: Developing Transferable Knowledge for the 21st Century*. The report acknowledges that domains of learning are interrelated and that Cognitive Skills are required in multiple domains.

[2] Each of the leading frameworks differ slightly in the terminology they employ. See: Conley, D. (2012); Partnership for 21st Century Skills. (2016).

[3] Researchers at Next Generation Learning Challenges have analyzed the nation's most prominent curriculum frameworks. A crosswalk of the frameworks demonstrates the near alignment of experts on the importance of teaching Cognitive Skills. See: Lash, D, Belfiore, G. & Calkins, A. (2017)

skills. Cognitive skill development, like other skills, has a “readiness pathway” beneath it that can be built, no matter what a student’s starting point (Osher, Cantor, Berg, Steyer & Rose, In Preparation 2017a, 2017b).

Additionally, a focus on cognitively rich curricula for all students actively combats what Martin Haberman (1991) calls “a pedagogy of poverty.” Rigorous thinking and authentic performance within supportive, feedback-rich environments must be accessible to all students if we are to combat systemic inequities and deliver on the promise of public education.

Finally, Summit’s emphasis on Cognitive Skills is based on our careful analysis of what skills employers value in future employees. Consider a 2016 national survey of the ten skills employers most want from college graduates, below. Skills such as teamwork, communication, and collaboration all top the list (NACE, 2016). Similar lists have been created by the Organisation for Economic Co-operation and Development Education (OECD, 2016) and the Partnership for 21st Century Skills (P21, 2016) based on an analysis of national and international economic and workforce demands.

Attributes Employers Seek on New College Graduates’ Resumes
From the National Association of Colleges and Employer Job Outlook 2016 Survey

Skill	**Percentage of employers seeking listed skill**
Leadership	80.1%
Ability to work in a team	78.9%
Communication skills (written)	70.2%
Problem-solving skills	70.2%
Communication skills (verbal)	68.9%
Strong work ethic	68.9%
Initiative	65.8%
Analytical/quantitative skills	62.7%
Flexibility/adaptability	60.9%
Technical skills	59.6%
Interpersonal skills (relates well to others)	58.4%
Computer skills	55.3%
Detail-oriented	52.8%
Organizational ability	48.4%

Friendly/outgoing personality	35.4%
Strategic planning skills	26.7%
Creativity	23.6%
Tactfulness	20.5%
Entrepreneurial skills/risk-taker	18.6%

What are Summit's evidence-based principles and educator design choices related to Cognitive Skills?

"Today's high-performance workplace calls for the same kind of person that Horace Mann and John Dewey sought: someone able to analyze a situation, make reasoned judgments, communicate well, engage with others to reason through differences of opinion, and intelligently employ the complex tools and technologies that can liberate or enslave, according to use. What is more, the new workplace calls for people who can learn new skills and knowledge as conditions change—lifelong learners, in short."

— Lauren Resnick, *Getting to Work: Thoughts on the Education and Form of School-to-Work Transition*

Evidence-Based Principles

- In order to be successful in both college and careers, students need to master a set of Cognitive Skills (NRC, 2012; Conley, 2012; Fadel et al., 2015; CCSS, 2010; NGSS, 2013).
- In the 21st century, proficiency in skills at the end of high school is more valuable than proficiency in the content of any given subject matter (NRC, 2012; Perkins, 2014).
- Students develop Cognitive Skills over time; the skills must be accessed within each student's zone of proximal development (Bruner, 1960; Wood, Bruner & Ross, 1976; Vygotsky, 1978).
- Cognitive Skills are learned best through strategies that require deeper learning. The deepest learning is inquiry-based, authentic, and active (AIR, 2014; Barron & Darling-Hammond, 2008).
- Cognitive Skills extend beyond traditional disciplines; the same skill can be applied in multiple disciplines (Perkins, 2014).
- Students need multiple opportunities to deliberately practice the same skills (Schwartz et al., 2016).
- Timely feedback is essential for the development of students' Cognitive Skills (Schwartz et al., 2016; Hattie & Timperley, 2007).

Educator Design Choices

Cognitive Skills Rubric

To put our principles into practice, we have made a design choice to create a single, research-based Cognitive Skills Rubric based on feedback from hundreds of educators, and validated by the Stanford Center for Assessment, Learning, and Equity (SCALE). At Summit, students develop Cognitive Skills in every subject and in every grade level.

In the rubric, 36 cognitive skills fall into the following seven domains:

1. Textual Analysis
2. Using Sources
3. Inquiry
4. Analysis & Synthesis
5. Composing/Writing
6. Speaking & Listening
7. Products & Presentations

Competency-Based Progression

For each Cognitive Skill, students must score a 6 on a 0–8 point scale to demonstrate college and career readiness. Students progress along a continuum demonstrating competency in a skill as appropriate for their level of development and growth. **We prioritize the development of Cognitive Skills; a student's score on the Cognitive Skills Rubric contributes more to a student's grade than does any other outcome measure.**

Project-Based Learning

Students refine and improve their Cognitive Skills through project-based learning (PBL). We have adopted the Buck Institute for Education's definition of project-based learning as "a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge" (2017). Related definitions of *deeper learning, inquiry-based learning*, and *student-centered learning* have all informed our work.[4]

Summit educators have built out, field-tested, and refined a library of projects in grades 6–12. Students work on projects during project-based learning, where they apply the content they have learned to real-world situations to develop these essential and transferable lifelong skills. Multiple Cognitive Skills are embedded in each project. Most projects culminate in a performance-based assessment such as an essay, lab report, or presentation.

[4] Our approach to project-based learning has been influenced by the Buck Institute for Education, by the Hewlett Foundation's emphasis on deeper learning, by the Nellie Mae Foundation's research on student-centered learning, and by the Expeditionary Learning network EL Education.

To ensure that project-based learning meets the highest levels of rigor and quality, all of our projects are evaluated on our Project Quality Rubric, which is based on SCALE's task quality rubric and is aligned to the Buck Institute's Project Design Rubric.

Cognitive Skills for College and Career Readiness
The Summit Learning Cognitive Skills Rubric is an assessment and instruction tool that outlines the continuum of 36 interdisciplinary, higher-order thinking skills (pictured here) that are necessary for college and career readiness. Developed in collaboration with the Stanford Center for Assessment, Learning & Equity, May, 2017.

Cognitive Skill Domain	Description
Using Sources	• Selecting relevant sources • Contextualizing sources • Synthesizing multiple sources
Inquiry	• Asking questions • Defining a design problem • Predicting/hypothesizing • Planning and carrying out investigations
Analysis & Synthesis	• Organizing and representing information • Identifying patterns and relationships • Comparing/contrasting • Modeling • Interpreting data/info to make valid claims • Making connections and inferences • Evaluating competing design solutions • Evaluating arguments • Designing a solution • Constructing an evidence-based explanation
Composing/Writing	• Argumentative claim • Informational/explanatory thesis • Narrative • Counterclaims • Selection of evidence • Explanation of evidence • Integration of evidence • Organization (transitions, cohesion, structure) • Introduction and conclusion
Listening & Speaking	• Contributing to evidence-based discussions • Norms/active listening
Products & Presentations	• Oral presentation • Multimedia in communication

	• Communicating accurately and precisely
Textual Analysis (Close Reading)	• Theme/central idea • Point of view/purpose • Development • Structure • Word choice

What lessons have we learned about the development of Cognitive Skills?

We have learned that teachers are excited to teach Cognitive Skills but that they require significant support and development to do so. Most teacher preparation programs still prepare new teachers to focus predominantly on the teaching of Content Knowledge. Math and science teachers, for example, do not receive extensive training in the teaching of writing or other literacy strategies. We have learned that helping teachers gain the skills, self-confidence, and mindsets required to teach Cognitive Skills alongside Content Knowledge requires sustained investment and support. Similarly, school leaders need support and coaching to help teachers develop their practice.

We have learned that the teaching of mathematics can be substantively different from the teaching of other subjects. Our approach recognizes the centrality of conceptual understanding, as well as the fact that neither content-based focus areas nor skills-based projects are sufficient for developing students' understanding.

In the 2016–2017 school year, we introduced an approach that adds "concept units" into math courses. Such units involve students solving a carefully sequenced series of inquiry-based math problems, aimed at fostering conceptual understanding.

We have learned that some subjects naturally emphasize some skills more than others. We have developed "beacon skills" as sets of skills that are most prevalent in particular disciplines. For example, Theme and Point of View are beacon skills in English Language Arts courses, while Modeling is a beacon skill in math.

What open questions continue to inform the development of Cognitive Skills?

- How do we continuously refine and improve our understanding of the Cognitive Skills students need most?
- How do we help teachers broaden their focus from the teaching of Content Knowledge to the teaching of Cognitive Skills?
- How do we support teachers in contextualizing Cognitive Skills to their disciplines and projects without adding unnecessary complexity to our assessment system?
- To what extent does a particular level of achievement on a Cognitive Skill in one discipline transfer to the same level of achievement in another discipline?
- How do we most effectively calibrate on Cognitive Skill scoring?

Cognitive Skills at a Glance

Evidence-Based-Principle	Research Base	Educator Design Choices
In order to be successful in both college and careers, students must master a set of Cognitive Skills.	CCSS (2010) NRC (2012) Conley (2012) NGSS (2013) Fadel et al. (2015)	In partnership with the Stanford Center for Assessment, Learning, and Equity (SCALE), we have co-developed a single Cognitive Skills Rubric outlining 36 Cognitive Skills necessary for college and career readiness. SCALE designed the progression in each Cognitive Skill so that a 6 (on a 0–8 point scale) on the rubric corresponds with a measure of college-readiness for each skill. Students must score a 6 to demonstrate college readiness.
In the 21st century, proficiency in Cognitive Skills at the end of high school is more valuable than proficiency in the content of any given subject matter.	NRC (2012) OECD (2016) Perkins (2014) Fadel et al. (2015)	Summit's grading policy prioritizes the importance of Cognitive Skills over other student outcomes.
Students develop Cognitive Skills over time; the skills must be accessed within each student's zone of proximal development.	Bruner (1960) Wood, Bruner & Ross (1976) Vygotsky (1978)	Students encounter the same skills in all grade levels (6–12) and in all subjects. Student progress along a continuum from Levels 0–8 on the Cognitive Skills Rubric, demonstrating competency in a skill as appropriate for their level of development and growth.

Cognitive Skills are learned best through strategies that require deeper learning. The deepest learning is inquiry-based, authentic, and hands-on.	Barron & Darling-Hammond (2008) AIR (2014) Perkins (2014) Fadel et al. (2015)	Cognitive Skills are taught through projects. For every discipline, Summit teachers have developed projects that require multiple Cognitive Skills. Projects are oriented around essential questions. Projects are based on topics that are of high interest to students.
Cognitive Skills are interdisciplinary and are learned more deeply when students can practice them in multiple contexts across disciplines.	EPIC (2012) Perkins (2014) Fadel et al. (2015)	The same Cognitive Skills are assessed multiple times per year across different disciplines. Many of Summit's projects are interdisciplinary.
Students have multiple opportunities to deliberately practice the same skills.	Schwartz et al. (2016)	In Summit's base curriculum, students are exposed to, and held accountable for, each of the Cognitive Skills multiple times per year.
Timely feedback is essential for the development of students' Cognitive Skills.	Hattie & Timperley (2007) Schwartz et al. (2016)	All projects are built with a series of checkpoints, or opportunities for formative assessment feedback. Students have multiple structured opportunities for feedback from teachers, peers, and self.

References for Further Learning

- Grant Wiggins: *Educative Assessment: Designing Assessments to Inform and Improve Student Performance* (1998)
- David Conley: *A Complete Definition of College and Career Readiness* (2012)
- David Perkins: *FutureWise: Educating Our Children for a Changing World* (2014)
- Charles Fadel, Maya Bialik, & Bernie Trilling: *Four Dimensional Education: The Competencies Learners Need to Succeed* (2015)

Content Knowledge: Rigorous Content Across All Academic Subjects

“The very processes that teachers most care about — critical thinking processes such as reasoning and problem-solving — are intimately intertwined with actual knowledge that is stored in long-term memory.”

— Daniel Willingham, *Why Don’t Students Like School?*

“Knowledge infuses all learning. Prior knowledge enables people to make sense of new information and ‘post’ knowledge enables people to imagine and achieve goals they previously could not.”

— Daniel Schwartz et al., *The ABCs of How We Learn*

What is Content Knowledge?

In order to put Cognitive Skills to work, our students must develop a broad knowledge base. Students must understand academic subjects more deeply than a web search can provide.

A foundational component of Summit Learning is that students demonstrate competency on standards-aligned Content Knowledge across all core subject areas. Content Knowledge includes a set of vocabulary, ideas, events, concepts, properties, and details related to a given academic discipline.

What is the research base behind Content Knowledge?

There is substantial evidence in learning science that Content Knowledge supports and enables critical thinking (Willingham, 2009; Schwartz et al., 2016). The acquisition of basic familiarity with the language, details, procedures or terms of a given discipline, and the retention of that knowledge in long-term memory, aid the fluency and expertise with which individuals can practice a given discipline moving forward. Cognitive scientists have demonstrated that having specific Content Knowledge in a given discipline accelerates mastery of the subject (Schwartz et al., 2016).

In the field of reading, for example, several studies have shown that background knowledge on a specific topic helps readers regardless of overall reading comprehension ability. In one such study, researchers compared middle school students who had tested as either “good readers” or “poor readers” on a standardized test of reading comprehension. Teachers then introduced a reading passage about American baseball to both groups. The teenagers who had previous background knowledge and expertise related to the details of baseball scored higher on the reading comprehension test regardless of whether they had been considered poor or good readers more generally (Recht & Leslie, 1988). Multiple studies have confirmed similar findings on the importance of background knowledge to the process of learning (Brown, Roediger & McDaniel, 2014).

What are Summit's evidence-based principles and educator design choices related to Content Knowledge?

"Scholars need to drive a shift from a world where traditional knowledge is depreciating rapidly in value, towards a world in which the enriching power of deep competencies is increasing, based on a relevant blend of traditional and modern knowledge, along with skills, character qualities, and self-directed learning."

— Charles Fadel, *Four-Dimensional Education: The Competencies Learners Need to Succeed*

Evidence-Based Principles

- In order to be successful in college and careers, students must master rigorous Content Knowledge in each of the academic disciplines (CCSS, 2010; NGSS, 2013; Conley, 2012; Fadel et al., 2015).
- Students acquire new Content Knowledge in reference to existing Content Knowledge (Bransford, Brown & Cocking, 2000; Deans for Impact, 2015).
- Content that is presented in multiple modalities allows for greater practice.[5]
- Content knowledge acquisition is foundational to the development of Cognitive Skills (Schwartz et al., 2016).
- Each subject area has a set of facts that, if committed to long-term memory, supports problem-solving by freeing working memory resources and illuminating contexts in which existing knowledge and skills can be applied. The set of facts varies by subject matter (Glaser & Chi, 1988; Deans for Impact, 2015).
- Students need to explore Content Knowledge at their own pace based on their own interests (Rose, 2016).
- A key component of developing students' self-direction is the development of student agency (Stafford-Brizard, 2016).
- Students need multiple opportunities to demonstrate competence in Content Knowledge (AIR, 2016).
- Students learn at different rates (Rose, 2016).
- A key component of developing students' self-direction is the development of student agency (Stafford-Brizard, 2016).
- Students need multiple opportunities to demonstrate competence in Content Knowledge (AIR, 2016).
- Students learn at different rates (Rose, 2016).

[5] Daniel Willingham (2009) and others have argued that the evidence for different learning styles is thin and that cognitive processes are more alike than different. It is clear, however, that there is merit to presenting Content Knowledge in multiple modalities such as visual, auditory, and/or kinesthetic, regardless of students' learning styles. There is also evidence that introducing content in different manners fosters repetition, which enables learning. See: Mayer, R. (2001).

Educator Design Choices

Focus Areas and Power Focus Areas

Summit teachers have created and refined standards-aligned resources to teach Content Knowledge in each subject. The content has been divided into key focus areas across grade spans, and all of the focus areas are closely aligned to the Common Core Standards and the Next Generation Science Standards (NGSS). Power focus areas refer to the specific focus areas that are required for advancement to the next course. At Summit Public Schools, all course progressions end in college-level, Advanced Placement (AP) courses.

For each focus area, students have access to playlists that contain different types of learning materials (primary sources, videos, decks, written materials, etc.). Students and families have access to learning resources at all times and are able to engage the entire curriculum.

Self-Directed Learning

Students progress through the focus area playlists contained on the Summit Learning Platform at their own pace during blocks of time, called Personalized Learning Time, set aside for self-directed learning. Students exercise choice in determining which resources to review, when to take assessments, and the environmental conditions under which they learn best.

Teachers serve as facilitators of self-directed learning. They identify students who need additional support in self-directed learning and in the content itself. Students have access to additional, more challenging focus areas that allow them to dive more deeply into content of particular interest and relevance to them. They also have access to peers, high-leverage learning strategies, mentors, and subject-area teachers for support. Students are empowered to make decisions about when and how to learn.

What lessons have we learned about the development of Content Knowledge?

In education, there is often a tendency for the pendulum to swing in one direction or another. Teaching that exclusively focuses on rote memorization does not motivate students or necessarily lead to retention in long-term memory (Willingham, 2009). At times, groups of educators have called for a complete departure from the teaching of Content Knowledge in favor of approaches that are more hands-on or have focused on skills acquisition without any intentional teaching of content. **We have carefully studied the history of these pendulum swings, and in taking stock of the evidence at our disposal at this time, we have concluded that Summit Learning will adopt an approach that focuses on both the acquisition of Content Knowledge and the development of Cognitive Skills.**

Most importantly, we have learned that how we explain the connections between content knowledge acquisition and cognitive skill development is central to teachers' instructional choices. Self-directed learning offers students a way to engage with content and demonstrate competence in focus areas, but it is the application of that knowledge in cognitively demanding projects that is of utmost

importance. Thus, it is just as important that teachers strategically intervene with individuals and groups of students on relevant Content Knowledge as it is that they do not spend valuable learning time lecturing whole groups about facts. This message is essential for teachers to effectively use available data, expertise, and time to support all students.

Our approach to content knowledge acquisition is as much about students' development of Habits of Success — particularly self-directed learning behaviors — as it is about Content Knowledge itself. By offering students full transparency about learning expectations, a plethora of multi-modal learning resources and assessment types, and significant choice in learning pathways, we are able to understand not only what students are learning, but also how students are learning. We have found that this approach of student agency, coupled with rapid support, leads to more effective, efficient learners.

Mathematics

Our approach to math differs from other subjects due to the nature of the discipline. The authors of the Common Core math standards and the National Council for Teachers of Mathematics advocate for an instructional approach that involves students making sense of new mathematics content by problem-solving before later practicing for fluency (CCSS Math Team, 2014). Since focus areas are not an appropriate medium for problem-solving involving new mathematics content, students' initial learning of most content comes in concept units; later, it is practiced in focus areas.

What open questions continue to inform the development of Content Knowledge?

- How do students engage in self-directed learning? What can we learn from their behaviors and patterns to improve their learning?
- How do we develop the best resources and approaches to the learning of content?
- How is the teaching of math content both similar and different to the teaching of other subject areas?
- How does the teaching of Content Knowledge interact with the teaching of Cognitive Skills? What are the mechanisms by which they reinforce one another?

Content Knowledge at a Glance

Evidence-Based-Principle	Research Base	Educator Design Choices
In order to be successful in college and careers, students must master rigorous Content Knowledge in each of the academic disciplines.	CCSS (2010) NGSS (2013) Conley (2012) Fadel et al. (2015)	The Summit base curriculum contains a full set of focus areas outlining key Content Knowledge for each subject. The focus areas for high school subjects are aligned to Common Core and Next

		Generation Science Standards. For college-level courses, the content is aligned to the AP standards.
Students acquire new Content Knowledge in reference to existing Content Knowledge.	Willingham (2009) Bransford, Brown, & Cocking (2000) Schwartz et al. (2016) AIR (2016) Deans for Impact (2015)	The focus areas are developed across the grade spans on a developmental continuum. Students are introduced to similar Content Knowledge topics in different grades, with increasing levels of complexity and depth. Completion of all power focus areas in one course is required for advancement to the next course.
Content that is presented in multiple modalities allows for greater practice.	Willingham (2009)	Students have access to playlists that contain different types of learning materials (primary sources, videos, decks, written materials, etc.). Students have access to learning resources at all times. Students are able to learn collaboratively with peers.
Content knowledge acquisition is foundational to the development of Cognitive Skills.	Schwartz et al. (2016) Willingham (2009)	Each focus area maps to specific projects. Teachers intervene with students when Content Knowledge will accelerate students' skill development in project-based learning.
Each subject area has a set of facts that, if committed to long-term memory, supports problem-solving by freeing working memory resources and illuminating contexts in	Glaser & Chi (1988)	Content progressions are spiralled, building knowledge in increasing complexity. Focus areas are broken into "Power," "Additional," and Challenge," which focuses

which existing knowledge and skills can be applied. The set of facts varies by subject matter.		students on the most important Content Knowledge while holding no students back from exploring and deepening interests.
Students need to explore Content Knowledge at their own pace based on their own interests.	Rose (2016)	Students progress through the focus area playlists on their own during self-directed learning time. Teachers serve as facilitators of self-directed learning and guide students, identifying students who need additional support in being self-directed learners. Students have access to additional, more challenging focus areas that allow them to dive more deeply into content of particular interest and relevance to them.
Students should have multiple opportunities to demonstrate competence in Content Knowledge. Learning must be prioritized over pace.	AIR (2016) Rose (2016)	Over the course of an academic year, students have multiple opportunities to perform at full potential on content assessments. Pace is tracked against the school year and against students' goals on the Summit Learning Platform. Students are empowered to make decisions about when and how to learn.
When students learn content at varying paces, they will be ready to take an assessment at varying points in time.	AIR (2016) Rose (2016)	On-demand content assessments are available to students. Students indicate when they are ready to take an assessment.

References for Further Learning

- Daniel Willingham: *Why Don't Students Like School?: A Cognitive Scientist Answers Questions About How the Mind Works and What It Means for the Classroom* (2009)
- Daniel Schwartz, Jessica M. Tsang, and Kristen P. Blair: *The ABCs of How We Learn:*
- *26 Scientifically Proven Approaches, How They Work and When to Use Them* (2016)
- Todd Rose: *The End of Average: How We Succeed in a World That Values Sameness* (2016)

Habits of Success: Behaviors, Mindsets, and Dispositions

"Successful engagement in the classroom and in life relies on a set of cognitive and social emotional skills and mindsets which are not represented in academic standards. When educators neither prioritize these skills and mindsets nor integrate them with academic development, students are left without tools for engagement or language for learning. They become dependent on adult-driven routines rather than on their own skills or motivation."

— K. Brooke Stafford-Brizard, *Building Blocks for Learning*

"Students who are learning to read and comprehend texts are likely to consider what the teacher thinks of them, the importance to them of making sense of the text, their ability to understand the text, and their interpretation of success or failure, all of which are influenced by their prior knowledge, their experiences with reading at school and at home, and their social and academic identities. Reading comprehension also depends on classroom and school factors — most notably relationship-building and instructional strategies that are developmentally appropriate and personalized."

— Osher et al., *The Science of Learning and Development*

What are Habits of Success?

Habits of Success are the social and emotional skills that enable students to be successful at both academic and non-academic pursuits. The field of social-emotional learning (SEL) is awash in terminology to describe factors required for successful learning, outside of traditional academic skills and Content Knowledge.

After a careful review of existing frameworks, Summit has adopted the *Building Blocks for Learning* framework developed by Dr. Brooke Stafford-Brizard on behalf of Turnaround for Children (2016). The Building Blocks framework integrates decades of the most promising research on social-emotional learning in an aligned and comprehensive manner.

Habits of Success include the development of skills in five categories:

1. **Healthy Development** (Attachment, Stress Management, Self-Regulation);
2. **School Readiness** (Self-Awareness, Social Awareness/Relationship Skills, Executive Functions);

3. **Mindsets for Self and School** (Growth Mindset, Self-Efficacy, Sense of Belonging, Relevance of School);
4. **Perseverance** (Resilience, Agency, Academic Tenacity); and
5. **Independence and Sustainability** (Self-Direction, Curiosity, Civic Identity).

We believe that students develop Habits of Success within the communal, relational context of a classroom. While other frameworks focus more heavily on the interaction between a student and his or her individual academic trajectory, our framework situates learning "within the social context of a classroom through a set of key relationships a student develops with teachers, peers, and other adults" (Stafford-Brizard, 2016). The Habits of Success framework was designed with an understanding that foundational skills are prerequisites for higher-order skills; skill development happens on a developmental pathway that integrates cognitive, social, and emotional skills.

The framework acknowledges that children do not always get the same start in life and do not all follow an identical path. It helps provide guidance to educators on how to support students who have experienced trauma and other adverse circumstances.

Building Blocks for Learning: A Framework for Comprehensive Student Development
Stafford-Brizard, K.B. (2016). Turnaround for Children

Level in pyramid	Category	Components
1 (base of pyramid)	Healthy Development	Attachment, stress management, self-regulation
2	School Readiness	Self-awareness, social awareness/relationship skills, executive functions
3	Mindsets for Self and School	Growth mindset, self-efficacy, sense of belonging, relevance of school
4	Perseverance	Resilience, agency, academic tenacity
5 (top of pyramid)	Independence and Sustainability	Self-direction, curiosity, civic identity

What is the research base behind Habits of Success?

The 16 skills were chosen based on three criteria:

- They align to the development of the child as a "learner" in an educational setting;
- They are measurable skills, behaviors, or mindsets that students can develop over time;
- There is a strong research base demonstrating impact of the skill, behavior, or mindset on college and career success.

Each skill, which we define as a Habit of Success, draws on its own deep literature and evidence base. For example, the skills considered to be part of healthy development and school readiness are drawn from the fields of neuroscience and child development and include having strong bonds with

adults, emotional security, and the skills to cope and manage stress (Stafford-Brizard, 2016). Similarly, the student-held mindsets are derived from the work of Camille Farrington and teammates at the University of Chicago Consortium on Chicago Schools Research. Farrington et al. have demonstrated the relationship between highly-developed habits of success (what Farrington calls “non-cognitive factors”) and high levels of student achievement.

What are Summit’s evidence-based principles and educator design choices related to Habits of Success?

Evidence-Based Principles

- Students need to develop skills, dispositions, mindsets, and behaviors that:
    - Are malleable (can change over time) (Mindset Scholars Network, 2015);
    - Are academically important (Farrington, 2012; Stafford-Brizard, 2016);
    - Recognize the social nature of learning (Schwartz et al., 2016); and
    - Align with important milestones of adolescent development (AIR, 2017).
- Learning should be culturally responsive and recognize that children learn about the world around them within the context of their own culture (Dee & Penner, 2016; Ladson-Billings, 1995).
- Habits of Success should be developed as part of a cohesive academic program (Farrington, 2012; Stafford-Brizard, 2016; AIR, 2017; Costa & Kallick, 2008).
- Students with a sense of belonging in school feel socially connected, supported, and respected. They trust their teachers and their peers, and they feel like they fit in at school.
- Approaches to student behavior and discipline should be restorative in nature (Fronius, Persson, Guckenburg, Hurley, & Petrosino, 2016).
- The assessment of Habits of Success should be used to support students’ growth and development and for program improvement purposes. Assessment should not be used for the purposes of grading, evaluation, or promotion (Duckworth & Yeager, 2015).
- Habits of Success must be modeled within the school environment: in adult interactions; within school routines, celebrations, policies, and procedures; and as part of ongoing professional development for educators (Berger, Rugen & Woodfin, 2014; Costa & Kallick, 2008).

Educator Design Choices

Summit uses the term “Habits of Success” to describe the dispositions, mindsets, and behaviors that students need to be successful in college and career. We have chosen this term because we believe that these behaviors will equip students for success in school, college, career, and life. Social-emotional learning should not be relegated to a separate program; rather, it should be integrated as design elements that permeate a school model. All educators, even content-area specialists, are responsible for the social and emotional well-being of our students.

Our goal is that by the time Summit students graduate, they are able to demonstrate the skills of independence (without scaffolds) and transfer (in multiple contexts) of Self-Direction, Curiosity, and Civic Identity — the top row of the Building Blocks for Learning framework.

The following design choices are critical to the development of Habits of Success:

Individualized, Weekly Mentoring

At Summit, all students engage in 1:1 mentoring each week. This time is focused on setting goals, developing action plans, and reflecting on progress. Mentors carefully review the data on the Summit Learning Platform for each of their mentees, and help identify students who are struggling and who might need additional support and/or interventions. Even though a mentor usually only teaches one subject area, s/he is responsible for overseeing a student's comprehensive academic and social experience at school. Mentors monitor how students are doing in all subject areas and in all domains of social and emotional development.

At Summit Schools, all educators are mentors for students over the span of four years, in addition to being core academic teachers. Students spend 60–90 minutes per week in dedicated time with peers who share their mentor. The time, called Mentor Time, is spent on positive identity formation, academic belonging, attachment, and explicit instruction of Habits of Success. The mentor leads this time and a standard, but adaptable, curriculum is provided.

Self-Directed Learning

Self-directed learning is as much about developing Habits of Success as it is about learning Content Knowledge. Within a self-directed learning environment, teachers carefully guide students as they develop habits of agency, self-awareness, academic tenacity, curiosity, and self-direction.

Project-Based Learning

Summit's curriculum team works with teachers to integrate Habits of Success into the development of projects in all subjects and grade levels.

Professional Development for Teachers

Teachers at Summit Schools participate in professional development around a set of instructional look-fors, and several of those look-fors are based on research-based practices for helping students build Habits of Success. For example, Summit teachers participate in a course on helping students build a growth mindset by providing feedback that refers to effort rather than innate ability.

Home-School Connections

Home-school connections further advance Habits of Success. It is critical to celebrate a student's home culture, language, and perspective as an asset to our learning community. Students participate in family meetings to set goals for growth in Cognitive Skills, Content Knowledge, and Habits of Success, and so that educators can better understand how to tailor habits support to students' cultures and contexts. Families attend multiple celebrations of learning and activities throughout the year.

Belonging in a Community

To develop a student's sense of belonging, students at Summit Schools participate in multiple community-building activities. School begins with a camping trip for students as well as orientation

for new students. Summit students participate in community-wide celebrations of learning to share projects and Expedition work. Through both projects and Expeditions, teachers create a myriad of opportunities for students to interact with local community organizations and business leaders.

Restorative Practices

Summit Public Schools engages in a restorative practices approach, one that focuses on fostering positive, healthy school climates and helping students learn and grow from their decisions.

Assessment

Summit Public Schools is beginning to develop measures of Habits of Success to help inform mentor conversations. Student data related to Habits of Success is for program improvement and student support purposes only; it is not used for accountability or student reporting.

Self-Directed Learning Cycle Students use the Self-Directed Learning Cycle to set goals, develop a plan to achieve those goals, learn what they need to know, show evidence of what they have learned, and reflect on the process.	
Step number	**Description**
1	Set goal
2	Plan
3	Learn
4	Show
5	Reflect
Once steps one through five are completed, the cycle starts again at step one.	

What lessons have we learned about the development of Habits of Success?

For years, Summit has focused on applying cutting-edge research to help students build habits, mindsets, and behaviors that will support success in college and careers. We have developed learning approaches and aligned assessments for “growth mindset,” “belonging,” and “emotional intelligence.” We have validated early measurement techniques to assess these behaviors for improvement purposes.

Specifically, we have learned the following lessons:

- Habits of Success are nuanced and complex, but they must be made simple enough to implement. By beginning at the bottom level of the Building Blocks of Learning framework

pyramid, we provide educators a natural and succinct entry point into the more complex developmental layers of social-emotional development.
- Habits of Success must be woven into the fabric of a school's schedule, culture, and curriculum, but different habits need to be the focus of different times of day. It is too confusing and abstract to educators and to students to say, "focus on habits." Instead, we integrate habits into curricula in smaller, discrete ways.
- The reason to assess Habits of Success is to gain a better understanding of how a student learns and the motivational or psychological variables that might influence the process. Focusing on students' process of learning and the root causes of student success will enable truly equitable personalized learning environments.

What open questions continue to inform the development of Habits of Success?

- How do we develop curriculum, resources, and educational programs to most effectively help students build each of the Habits of Success throughout his or her experience at Summit?
- How can we best support educators to both model and teach Habits of Success?
- How do we continue to demonstrate the relationship among skills, behaviors, and mindsets and other measures of academic achievement?
- What are the appropriate measures for the assessment of Habits of Success?

Habits of Success at a Glance

Evidence-Based-Principle	Research Base	Educator Design Choices
Students need to develop skills, dispositions, mindsets, and behaviors that: ● Are malleable; ● Are academically important; ● Recognize the social nature of learning; and ● Align with the milestones of adolescent development.	Farrington (2012) Mindset Scholars Network (2015) Stafford-Brizard (2016) AIR (2017)	Summit uses the term "Habits of Success" to describe the dispositions and behaviors that students need to be successful in college and careers. A common language is helpful for systematically developing students' Habits of Success; Summit has adopted the Building Blocks of Learning framework.
Learning should be culturally responsive and recognize that children learn about the world around them within the context of their own culture.	Dee & Penner (2016) Ladson-Billings (1995)	Project-based and self-directed content and curricula are designed to be culturally relevant for students and are

		adaptable at the discretion of teachers and site leaders.
Habits of Success should be developed as part of a cohesive academic program.	Farrington (2012) Stafford-Brizard (2016) Osher et al. (2017)	At Summit Schools, Habits of Success are integrated into both curriculum and instructional practices for project-based learning and self-directed learning time. Our base curriculum includes the development of Habits of Success into projects in all subjects and grades. All educators at Summit Schools participate in professional development related to Habits of Success.
Students with a sense of belonging in school feel socially connected, supported, and respected. They trust their teachers and their peers, and they feel like they fit in at school.	Mindset Scholars Network (2015) Duckworth & Yeager (2015)	Students engage in 1:1 mentoring with their mentors every week. Mentors and mentees jointly review data on the Summit Learning Platform. Mentor track data for each of their mentees and help identify students who are struggling and might need additional support. At Summit Schools, students spend 60–90 minutes per week in dedicated time with peers who share their mentor. Students remain with the same mentor throughout their years at Summit Schools and have annual “Family Meetings” to provide coordinated support to students.

Approaches to student behavior and discipline should be restorative in nature.	WestEd (2016)	Summit Schools implement many of the key components of restorative justice approaches.
The assessment of students' Habits of Success should be used to support students' growth and development, and for program improvement purposes. It should not be used for the purposes of grading, evaluation, or promotion.	Berger et al. (2014) Duckworth & Yeager (2015)	Mentors can analyze each mentee's strengths and areas for growth in the domain of Habits of Success and can have targeted conversations for improvement. Educators at Summit Schools have begun to develop early measures of Habits of Success to help inform mentoring conversations and improve student supports.
Habits of Success must be modeled within the school environment: in adult interactions, within school routines, celebrations, policies, and procedures, and as part of ongoing professional development.	Costa & Kallick (2008) Berger et al. (2014)	Summit Schools have developed a series of programs to foster and develop Habits of Success. School leaders and teachers at Summit Schools participate in professional development in which they self-assess their own Habits of Success, develop an individualized plan for growth, and learn how to model Habits of Success with students.

References for Further Learning

- K. Brooke Stafford-Brizard: *Building Blocks for Learning: A Framework for Comprehensive Student Development* (2016)
- Camille Farrington et al. (The University of Chicago Consortium on School Research): *Teaching Adolescents to Become Learners: The Role of Noncognitive Factors in Academic Performance: Critical Literature Review* (2012)
- Carol Dweck: *Mindset: The New Psychology of Success* (2007)

Sense of Purpose: Self-Knowledge, Values, Relationships, and a Credible Plan

“Having a purpose is different from being tracked into a specific vocation or outcome — it’s being oriented toward a vision of the future; a motivation to help the world around you or both. The goal or purpose itself can be general, and it can be relatively temporary. When kids are motivated by a larger purpose, studies show that they have more academic motivation, life satisfaction, identity formation, and vocational success.”

— Angela Duckworth, The Character Lab

“Wellbeing is about the combination of our love for what we do each day, the quality of our relationships, the security of our finances, the vibrancy of our physical health, and the pride we take in what we have contributed to our communities. Most importantly, it’s about how these five elements interact.”

— Tom Rath and Jim Harter, *Wellbeing: The Five Essential Elements*

What is Sense of Purpose?

Students need to graduate high school with a Sense of Purpose, which we define as an understanding of their interests, values, and skills, and the articulation of a credible path after high school for translating those interests, values, and skills into fulfilled lives. Most immediately, students need a next step out of high school that is aligned with the long-term goals they hope to achieve, and that is supported by family members, teachers, and other important adults in a student’s life.

At Summit, Sense of Purpose has five critical components:

1. **Self-Awareness (Interests, Skills, Knowledge, and Habits):** Students need exposure to multiple interests, the ability to explore such interests, and opportunities to pursue those interests.
2. **Values:** Students need support understanding what they value and how to live those values in order to lead a fulfilled life, in which they make intentional trade-offs between different options based on values.
3. **Relationships:** We need students to effectively and proactively build relationships that are not merely transactional, but also that put them in contact with people who want them to be their best selves.
4. **Credible Path Toward Long-Term Goals:** Students need to be able to articulate their future goals and have a credible path toward meeting those goals.
5. **Transition:** Students need a next step out of high school that is aligned with their interests, skills, knowledge, habits, values, and the long-term goals they hope to achieve. Family members, teachers, and other important adults in a student’s life should support this next step.

What is the research base behind Sense of Purpose?

Research in developmental psychology suggests that a key goal of adolescence is for young people to gain a Sense of Purpose. William Damon, of the Stanford Center on Adolescence, uses the term purpose as “a stable and generalized intention to accomplish something that is at the same time meaningful to the self and consequential for the world beyond the self.” Damon’s research divides students into four typologies: the dreamers, the dabblers, the disengaged, and the purposeful. Purposeful students “exhibit high degrees of persistence, resourcefulness, resilience, and capacity for healthy risk-taking (Damon, 2008).”

Martin Seligman (2013) suggests that three interrelated factors are essential to identifying purpose: 1) understanding of one’s strengths and skills; 2) understanding of one’s interests and passions; and 3) understanding of what the world needs.

David Yeager and colleagues have studied what they call a “pro-social, self-transcendent purpose for learning.” Yeager found that students with such a purpose rated their schoolwork as more personally meaningful than adolescents with no career goal or only an extrinsic motivation for doing well in school (such as making money or gaining respect). In another study, Yeager and his team also found that students persisted longer on a boring task when they could articulate such a purpose (Yeager, 2014).

Research from Curriculum Frameworks

Many of the frameworks that have most influenced Summit’s instructional approach contain an emphasis on purpose although the terminology differs slightly across frameworks:

- The “Go” section of EPIC’s college and career readiness model includes “key transition knowledge and skills.” Such competencies include:
    - Contextual issues;
    - Procedural issues;
    - Financial issues;
    - Cultural issues; and
    - Personal issues (Conley, 2012).
- Researchers at Next Generation Learning Challenges have coined the term “wayfinding ability” as the knowledge and capacity to successfully navigate college, career, and life opportunities and choices (Lash, Belfiore & Calkins, 2017). The following skills and competencies are included in the “wayfinding” ability:
    - Surveying the college, career and life landscape;
    - Identifying opportunities and setting goals;
    - Developing personal roadmaps;
    - Finding needed help and resources; and
    - Navigating each stage of the journey.

Additional frameworks developed by California ConnectEd (2012) and the New Zealand Education Ministry further support the importance of students’ Sense of Purpose.

What are Summit's evidence-based principles and educator design choices related to Sense of Purpose?

Evidence-Based Principles

- Individuals with a strong Sense of Purpose and belonging are more likely to persist toward their goals (Damon, 2008).
- Deliberate practice in the art of short-, medium-, and long-term goal-setting supports students' development and attainment of a Sense of Purpose (Dweck, 2007).
- Developing a student's self-knowledge is a key building block for learning and for other long-term student outcomes (Goleman, 1995).
- Deep, hands-on exploration of a diverse array of subject areas, professional fields, and work-settings not only helps expose students to new experiences but also develops self-knowledge and supports an emergent Sense of Purpose (AIR, 2014; Barron & Darling-Hammond, 2008).
- Students with a sense of belonging in school feel socially connected, supported, and respected. They trust their teachers and their peers. They are not worried about being treated as a stereotype and are confident that they are seen as a person of value (Romero, 2015).
- In order to achieve their college and career goals, students need an understanding of the transition to the college and career landscape including, but not limited to, practical, financial, and logistical requirements and admission processes (Lash, Belfiore & Calkins, 2017).

Educator Design Choices

At Summit Schools, students develop purpose by engaging in the following design choices:

- Goal-Setting
- Mentor Community
- Expeditionary Learning: Expeditions, Internships, and Service Trips

Goal-Setting

Students practice setting short-, medium-, and long-term goals in nearly every aspect of Summit's instructional approach. A key function of the Summit Learning Platform is a dynamic goal-setting page that students revisit frequently. On the platform and in conversation with teachers and mentors, Summit students connect their long-term aspirations, such as college acceptance, with the actions that they must take in the short-term. For example, in order to be accepted to a highly-selective university, students need to demonstrate proficiency in specific Cognitive Skills. The platform enables students to track how their current levels of proficiency connect to their future aspirations. In this way, students are able to understand how what they are learning today will directly prepare them for the goals they aspire to for tomorrow.

Mentor Community

Each student at a Summit School is part of a heterogenous mentor group that meets for 60–90 minutes each week. Students build self-awareness through interactions with those who hold different values, life experiences, interests, and cultural norms than their own. The focus of this mentor group time is on group bonding, academic belonging, and the development of Habits of Success (Surowiecki, 2004).

The mentor–student–family relationship also builds a bridge between home and school and between a student's past, present, and future. Each year begins with a family meeting in which the student leads a meeting with their mentor, parent/guardian(s), and any other relevant members of their personal advisory board (read more below) to reflect upon previously set long-term goals and to establish long-term and year-long goals.

Expeditionary Learning: Expeditions, Internships, and Service Trips

Since our founding, Summit has included a focus on Expeditionary Learning to enable students to experience in-depth, authentic, project-based learning for two weeks at a time. At Summit Schools, students spend eight weeks of each year (32 total weeks over the course of high school) in immersive elective courses called Expeditions. Expeditions are designed to allow students to be exposed to perspective-changing ideas and people, to explore interests, and to pursue passions.

Expeditions cover a wide variety of topics, such as video and film production, engineering, computer programming, graphic design, visual arts, music, health, and other courses. In high school, students participate in courses related to college readiness, where they learn about the college application and financial aid processes. Students also use the Expedition block to visit college campuses, an especially important opportunity for first-generation college students.

Career exploration is a major focus of Expedition curriculum. Summit students develop customized off-campus internships as an Expedition, where they conduct internships with local businesses, non-profits, hospitals, and other community organizations. Some students have worked with teachers to develop community service trips based on a particular social justice issue or interest.

Assessment of Sense of Purpose

The design choices described above have been implemented successfully at Summit Schools for more than ten years. However, we have long struggled with the appropriate assessment of Sense of Purpose. We believe that any outcome that we value should have an aligned assessment. **Summit is currently researching and developing new methods to assess Sense of Purpose, including the following components:**

- Portfolio
- Personal Advisory Board
- Oral Defense

Portfolio

A portfolio is a retrospective body of evidence that a student has curated and thoroughly analyzed in writing, as well as a prospective articulation of the student's long-term plan and next step. The portfolio focuses on how a student has developed into the person s/he is today and discusses growth in each of the Summit Learning Outcomes.

Evidence in the portfolio comes from the Summit Learning Platform, peer testimonials, mentor testimonials, and outside-of-school artifacts. Students work with their mentors to select the best evidence. The portfolio is assessed on the Cognitive Skills Rubric and must meet a checklist of specifications to be considered complete. The portfolio is accompanied by an oral defense, which takes place in the first semester of a student's senior year.

Personal Advisory Board

At the end of senior year, students will assemble a personal advisory board comprised of family members, teachers, mentors, Expedition leaders, and other key adults in the student's life. The student chooses his or her advisory board of individuals who have been, and continue to be, important to their lives. The advisory board reviews and provides feedback on the portfolio, and serves as the key audience for the oral defense.

When evaluating the student's oral defense, the advisory board asks the following questions:

- Does this defense demonstrate self-awareness? Does the student's self-perception align with the advisory board member's perceptions of the student?
- Does the student's long-term plan make sense in light of who the student is? Is the plan viable? Is it ambitious enough? Is it true to the student?
- Does the student's next step adequately get the student where they say they want to go? Is it realistic? Is the case the student makes one that is believable and supportable by the advisory board members?

When a student passes the oral defense, the advisory board celebrates the student's accomplishments and makes a public commitment to support the student's long-term plan.

Oral Defense

The oral defense is an opportunity for a student to highlight key components of his or her portfolio before a personal advisory board. **The oral defense includes the following components:**

- A brief narrative of the student's journey over the course of his or her time at Summit, including a discussion of his or her strengths, areas for growth, interests, and passions.[6]
- A discussion of a student's transition that carefully aligns with his or her self-knowledge and values. The transition should include a credible path toward achieving a long-term goal. The student's transition must be explained and defended relative to past and future.

[6] See DeLuca, Clampet-Lundquist and Edin, *Coming of Age in the Other America* (2016), for research and discussion of the importance of "identity projects" in high school to future success.

- A description (and thank-you) to members of the advisory board that have shaped who the student has become. Students ask the advisory board to play active roles in helping them support the articulated transition. Members of the advisory board make a public commitment to the student.

What lessons have we learned about the development of Sense of Purpose?

We have spent the past 15 years deeply invested in the development of Sense of Purpose. While some school models see student advising and planning as an add-on or discrete program, attended to perhaps only at the end of high school, we intentionally have infused the development of purpose into nearly every aspect of our academic program. From intensive mentoring and goal-setting to immersive Expeditions, our students begin and end their Summit experience with a focus on developing a Sense of Purpose.

Our extensive experience in the development of Sense of Purpose has taught us many lessons:

- Educators need to keep long-term goals present for students if the goals are to be truly motivational in driving daily actions and behaviors. The visual, dynamic data presented on the platform is a powerful way to keep goals front and center for students, community members, and teachers. It is also a way to help students break down long-term goals into smaller, more meaningful chunks.
- In-depth, immersive student Expeditions are critical to the development of purpose. By delving into one field of study (for example, engineering or graphic design) on a full-time basis, one field at a time, students have multiple opportunities to try out different pathways, goals, and future careers.
- Time is always a scarce resource in schools. The design choices required to develop purpose are generally the first to be cut when educators are constrained. It is critical for schools to protect the time required for students to develop Sense of Purpose.

What open questions continue to inform the development of Sense of Purpose?

- We have significant experience teaching the more tangible components of Sense of Purpose, but how do we teach and assess the more intangible components, such as self-awareness, persistence, and transitions?
- How do we develop an aligned system of professional development, curriculum, and assessments to help support the development of Sense of Purpose?
- How can we ensure that Summit Learning schools have access to the resources, additional time, and partnerships required to develop Sense of Purpose?

Sense of Purpose at a Glance

Evidence-Based-Principle	Research Base	Educator Design Choices
Individuals with a strong Sense of Purpose are more likely to persist toward their goals.	Duckworth (2016) Damon (2008) Yeager (2014)	The Summit Learning Platform helps seamlessly connect students' interests, values, goals, and areas of strength. Personalized, easy-to-understand data supports teachers as mentors.
Deliberate practice in the art of short-, medium-, and long-term goal-setting supports students' growth mindsets.	Dweck (2007)	Summit students engage in a family meeting to develop a long-term plan together with their personal mentor. Students have a 1:1 check-in with their mentors weekly. Students monitor their goals in real time on the Summit Learning Platform.
Developing students' self-awareness is a key building block for learning and for other long-term student outcomes.	Goleman (1995) Farrington (2012) Stafford-Brizard (2016)	Beginning in the middle school years, Summit students practice identifying their interests, passions, strengths, and opportunities for growth. The Summit Learning Platform allows students to opt for additional "challenge" content in areas of particular interest to a given student. Students meet in diverse mentor groups to discuss short- and long-term goals. The discussions allow for group reflection and peer feedback, further building a student's self-awareness. Students meet with mentors to discuss individual strengths, interests, and passions. As part of the portfolio and oral defense, students are required

		to make a statement describing their self-knowledge including their strengths and opportunities for growth.
Students with a sense of belonging in school feel socially connected, supported, and respected. They trust their teachers and their peers. They are not worried about being treated as a stereotype and are confident that they are seen as a person of value.	Mindset Scholars Network (2015)	The development of Sense of Purpose at Summit Schools happens within a community. Learning is inherently a social process. Students develop community among their mentor/mentee group, through Expeditions, and as a result of strong relationships with caring adults. The assessment of Sense of Purpose happens in a communal setting with an advisory board comprised of significant adults in a student's life.
Deep, hands-on exploration of a diverse array of subject areas, professional fields, and work settings exposes students, develops self-awareness, and supports an emergent Sense of Purpose.	Mathematica (2013)	Students at Summit Schools participate in eight weeks of Expeditions. Students elect a particular course or internship and engage in a full-time, immersive experience. Some students engage in a community-based service learning project. High school students also participate in college readiness Expeditions. They visit colleges, learn about the application and financial aid processes, and gain a deeper understanding of the practical, logical, and financial implications of the college process.
In order to achieve their college and career goals, students need an	Conley (2012)	The Summit Learning Platform introduces students, even at a young age, to the college

understanding of the transition to the college and career landscape, including, but not limited to practical, financial, and logistical requirements and admission processes.	ConnectEd (2012) Lash, Belfiore & Calkins (2017)	admission process by linking the requirements needed for admission into universities and college with day-to-day projects, assessment, and content. Students embark on college readiness Expeditions about admissions and financial aid processes.

References for Further Learning

- William Damon: *The Path to Purpose: How Young People Find Their Calling in Life* (2008)
- ConnectEd California: *College and Career Readiness: What Do We Mean? A Proposed Framework* (2012)
- Angela Duckworth: *Grit: The Power of Passion and Perseverance* (2016)

Conclusion

“Summit Learning does a great job of addressing equity through an ‘equity by design’ approach. Personalized learning is way too often confused with equity; personalized learning gives you the chance to have highly equitable environments, but alone it doesn’t guarantee it. By focusing on diversity and individuality at the same time in both practice and design you have given yourself a chance to create something that is both personal and equitable. This is an important point that rarely gets made in conversations about personalized learning.”

— Todd Rose, Author, *The End of Average: How We Succeed in a World That Values Sameness*

Bibliography

American Institutes for Research. (2014). *Findings from a Study of Deeper Learning Opportunities and Outcomes*. Retrieved from: http://www.air.org/project/study-deeper-learning-opportunities-and-outcomes

American Institutes for Research. (2016). *Looking Under the Hood of Competency-Based Education: The Relationship Between Competency-Based Education Practices and Students' Learning Skills, Behaviors, and Dispositions.* Retrieved from: http://www.air.org/resource/looking-under-hood-competency-based-education-relationship-between-competency-based

American Institutes for Research. (2017). *The Science of Learning and Development: A Synthesis*. Retrieved from: https://interconnectedbc.files.wordpress.com/2016/11/science-of-learning-and-development-a-synthesis.pdf

Barron, B., & Darling-Hammond, L. (2008). Teaching for meaningful learning: A review of research on inquiry-based and cooperative learning. In L. Darling-Hammond, B. Barron, P.D. Pearson, A.H. Schoenfeld, E.K. Stage, T.D. Zimmerman, G.N. Cervetti & J.L. Tilson, *Powerful learning: What we know about teaching for understanding*, (pp. 11-70). San Francisco, CA: John Wiley & Sons. Retrieved from: http://www.edutopia.org/pdfs/edutopia-teaching-for-meaningful-learning.pdf

Berger, R., Rugen, L., & Woodfin, L. (2014). *Leaders of Their Own Learning: Transforming Schools Through Student-Engaged Assessment*. San Francisco, CA: John Wiley & Sons.

Bransford, J. D., Brown, A. L. & Cocking, R. R. (Eds). (2000). *How People Learn: Brain, Mind, Experience and School*. Washington D.C.: National Academy Press.

Brown, P. C., Roediger III, H., and McDaniel, M.A. (2014). *Make It Stick: The Science of Successful Learning*. Boston: Belknap Press.

Bruner, J.S. (1960). *The Process of Education*. Cambridge, Mass.: Harvard University Press.

Buck Institute for Education. (2017). *What is Project Based Learning (PBL)?* Retrieved from: http://www.bie.org/about/what_pbl

California ConnectEd. (2012). *College and Career Readiness: What Do We Mean: A Proposed Framework*. Retrieved from: http://connectedcalifornia.org/direct/files/CACR%20Version%20V1-2%20Apr%2012%202012_FINAL.PDF

Common Core State Standards Math Team. (2014). *High School Publishers' Criteria for the Common Core State Standards for Mathematics*. Retrieved from:

http://www.corestandards.org/assets/Math_Publishers_Criteria_HS_Spring%202013_FINAL.pdf

Conley, D. (2012). *A Complete Definition of College and Career Readiness*. Eugene, OR: Educational Policy Improvement Center. Retrieved from: https://www.epiconline.org/ccr-definition/

Costa, A. L., & Kallick, B. (2008). Reporting growth in habits of mind. In Costa, A. L. & Kallick, B. (Eds.), *Learning and leading with habits of mind: 16 essential characteristics for success*, (pp. 258-268). Alexandria, VA: Association for Supervision and Curriculum Development.

Damon, W. (2008). *The Path to Purpose: How Young People Find Their Calling in Life*. New York: Simon & Schuster.

Deans for Impact. (2015). *The Science of Learning*. Austin, TX: Deans for Impact. Retrieved from: https://deansforimpact.org/wp-content/uploads/2016/12/The_Science_of_Learning.pdf

De Corte, E. (2003). Transfer as the Productive Use of Acquired Knowledge, Skills, and Motivations. *Current Directions in Psychological Science, (12)*4.

Dee, T., & Penner, E. (2016). *The Causal Effects of Cultural Relevance: Evidence from an Ethnic Studies Curriculum* (CEPA Working Paper No.16-01). Retrieved from Stanford Center for Education Policy Analysis: http://cepa.stanford.edu/wp16-01

DeLuca, S., Clampet-Lundquist, S., & Edin, K. (2016). *Coming of Age in the Other America*. New York: Russell Sage Foundation.

Duckworth, A. (2016). *Grit: The Power of Passion and Perseverance*. New York: Scribner.

Duckworth, A. (2017). *The Character Lab: Tools: Purpose*. Retrieved from: https://characterlab.org/tools/purpose

Duckworth, A. & Yeager, D. L. (2015). Measurement Matters: Assessing Personal Qualities Other Than Cognitive Ability for Educational Purposes, *Educational Researcher, 44*(4): 237–251.

Dweck, C.S. (2007). Mindset: *The new psychology of success*. New York, NY: Random House.

Fadel, C., Bialik, M., & Trilling, B. (2015). *Four Dimensional Education: the Competencies Learners Need to Succeed*. Boston: Center for Curriculum Redesign.

Fadel, C. (2015). *Redesigning the Curriculum for the 21st Century*: The Center for Curriculum Redesign, CCR Foundational Paper. Retrieved from: http://curriculumredesign.org/wp-content/uploads/CCR-FoundationalPaper_FINAL.pdf

Farrington, C.A. et al. (2012). *Teaching Adolescents to Become Learners: The Role of Noncognitive Factors in Academic Performance: Critical Literature Review*. The University of Chicago Consortium on School Research. Retrieved from: https://consortium.uchicago.edu/sites/default/files/publications/Noncognitive%20Report.pdf

Fronius, T., Persson, H., Guckenburg, S., Hurley, N., & Petrosino, A. (2016). *Restorative Justice in Schools: A Research Review*. WestED Justice & Prevention Research Center. Retrieved from: https://www.wested.org/resources/restorative-justice-research-review/

Glaser, R., & Chi, M. T. (1988). *Overview. In The Nature of Expertise* (pp. xv-xxvii). Hillsdale: Erlbaum.

Goleman, D. (1995). *Emotional Intelligence: Why It Can Matter More Than IQ*. New York: Bantam.

Haberman, M. (1991). The Pedagogy of Poverty Versus Good Teaching. *Phi Delta Kappan, (73)*4.

Hattie, J. & Timperley, H. (2007). The Power of Feedback. *The Review of Educational Research*, 77(1), 88-112. Retrieved from: http://education.qld.gov.au/staff/development/performance/resources/readings/power-feedback.pdf

Ladson-Billings, G. (1995). "Toward a Theory of Culturally Responsive Pedagogies." *American Educational Research Journal, 32*(3). pp. 465-491. Retrieved from: http://links.jstor.org/sici?sici=0002-8312%28199523%2932%3A3%3C465%3ATATOCR%3E2.0.CO%3B2-4

Lash, D, Belfiore, G. & Calkins, A. (2017). *The MyWays Success Framework: Student Competencies for Learning, Work, and Life*. Next Generation Learning Challenges (NGLC). Retrieved from: https://myways.nextgenlearning.org/

Mathematica Policy Research. (2013). Impacts of Five Expeditionary Learning Middle Schools on Academic Achievement. Retrieved from: https://www.mathematica-mpr.com/our-publications-and-findings/publications/impacts-of-five-expeditionary-learning-middle-schools-on-academic-achievement

Mayer, R. (2001). *Multimedia Learning*. New York: Cambridge University Press.

Mindset Scholars Network. (2015). Research Library. Retrieved from: http://mindsetscholarsnetwork.org/

National Association of Colleges and Employers. (2016). *Job Outlook 2016*. Bethlehem, PA: NACE. Retrieved from: https://www.naceweb.org/career-development/trends-and-predictions/job-outlook-2016-attributes-employers-want-to-see-on-new-college-graduates-resumes/

National Council of Teachers of Mathematics. (2014). *Principles to Actions: Ensuring Mathematical Success for All*. Reston, VA: NCTM.

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

National Research Council. (2012). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. Pellegrino, J. W. & Hilton, M. L. (Eds). Washington, D.C.: The National Academies Press.

NGSS Lead States. (2013). *Next Generation Science Standards*. Washington, D.C.: The National Academies Press.

Organisation for Economic Co-operation and Development (OECD). (2016). *Skills Matter: Further Results from the Survey of Adult Skills*. Paris: OECD Publishing. Retrieved from: http://www.oecd.org/skills/piaac/skills-matter-9789264258051-en.htm

Osher, D., Cantor, P., Berg, J., Steyer, L., & Rose, T. (In preparation 2017a). Malleability, plasticity, and individuality: How children learn and develop in context. *Applied Developmental Science*.

Osher, D., Cantor, P., Berg, J., Steyer, L., & Rose, T. (In preparation 2017b). Drivers of human development: How relationships and context shape learning and development. *Applied Developmental Science*.

Partnership for 21st Century Skills. (2016). *Framework for 21st Century Learning*. Retrieved from: http://www.p21.org/storage/documents/docs/P21_framework_0816.pdf

Perkins, D. (2014). *FutureWise: Educating Our Children for a Changing World*. San Francisco: Jossey-Bass.

Rath, T., Harter, J., & Grupper, A. (2010). *Wellbeing: The Five Essential Elements*. New York:Gallup *Press.*

Recht, D. R. & Leslie L. (1988). “The Effect of Prior Knowledge on Good and Poor Readers’ Memory of Text.” *Journal of Educational Psychology, 80*(1), 16-20.

Resnick, L.B. (1997). “Getting to Work: Thoughts on the Function and Form of School-to-Work Transitions.” In Lesgold, A., Feuer, M. J., & Black, A. M. (Eds.) *Transitions in Work and Learning; Implications for Assessment*. Washington, D.C.: National Academies Press.

Romero, C. (2015). *What We Knows About Belonging From Scientific Research*. The Mindset Scholars Network. Retrieved from: http://mindsetscholarsnetwork.org/wp-content/uploads/2015/09/What-We-Know-About-Belonging.pdf

Rose, T. (2016). *The End of Average: How We Succeed in a World That Values Sameness*. New York: HarperCollins.

Schleicher, Andreas (2012). *The Case for 21st Century Learning*, Organisation for Economic Development and Cooperation. Retrieved from: http://www.oecd.org/general/thecasefor21st-centurylearning.htm

Schwartz, D., Tsang, J. M., & Blair, K. P. (2016). *The ABCs of How We Learn: 26 Scientifically Proven Approaches, How They Work and When to Use Them*. New York: W. W. Norton & Company.

Seligman, M. E. P., Railton, P., Baumeister, B., & Sripada, C. (2013). "Navigating into the Future or Driven by the Past," *Perspectives on Psychological Science, 8*(2).

Stafford-Brizard, K. B. (2016). *Building Blocks for Learning: A Framework for Comprehensive Student Development*. Turnaround for Children. Retrieved from: http://turnaroundusa.org/wp-content/uploads/2016/03/Turnaround-for-Children-Building-Blocks-for-Learningx-2.pdf

Surowiecki, J. (2004). *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations*. New York: Doubleday.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, Mass.: Harvard University Press.

Wiggins, G. (1998). *Educative Assessment: Designing Assessments to Inform and Improve Student Performance*. San Francisco: Jossey-Bass.

Willingham, D. (2009). *Why Don't Students Like School?: A Cognitive Scientist Answers Questions About How the Mind Works and What It Means for the Classroom*. San Francisco: Jossey-Bass.

Wood, D., Bruner, J., & Ross, G. (1976). "The Role of Tutoring in Problem Solving." *Journal of Child Psychology and Child Psychiatry 17*(1), pp. 89-100.

Yeager, D. (2014). "Boring But Important: A Self-Transcendent purpose for Learning Fosters Academic Self-Regulation," *Journal of Personality and Social Psychology 107*(4), 559-80.