

Levers and Logic Models:

A Framework to Guide Research and Design of High-Quality Competency-Based Education Systems

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The National Summit on K-12 Competency-Based Education was held in 2017 to address four issues that are challenging the field. The report *Quality and Equity by Design: Charting the Course for the Next Phase of Competency-Based Education* summarizes four reports:

- [Fit for Purpose: Taking the Long View on Systems Change](#)
- [Designing for Equity: Leveraging Competency-Based Education to Ensure All Students Succeed](#)
- [Meeting Students Where They Are](#)
- [Quality Principles for Competency-Based Education](#)

This report, *Levers and Logic Models: A Framework to Guide Research and Design of High-Quality Competency-Based Education Systems*, draws upon the previous reports to provide a framework to build an even deeper understanding of competency-based education.

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About *CompetencyWorks*

CompetencyWorks is a collaborative initiative dedicated to advancing personalized, competency-based education in K-12 and higher education. iNACOL is the lead organization with project management facilitated by MetisNet. We are deeply grateful for the leadership and support of our advisory board and the partners who helped to launch *CompetencyWorks*: American Youth Policy Forum, Jobs for the Future, and the National Governors Association. Their vision and creative partnership have been instrumental in the development of *CompetencyWorks*. Most of all, we thank the tremendous educators across the nation that are transforming state policy, district operations and schools that are willing to open their doors and share their insights.

About iNACOL

The mission of iNACOL is to drive the transformation of education systems and accelerate the advancement of breakthrough policies and practices to ensure high-quality learning for all.



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I. Background

Competency-based education, also referred to as mastery-based, proficiency-based or performance-based education, is a system of education designed to equitably ensure all students develop the success skills they will need for college, career and life. The phrase **student success**, used throughout this paper, refers to *academic knowledge and skills, transferable skills* such as collaboration, problem-solving, creativity, and *lifelong learning skills*.¹ Competency-based education offers a foundation for personalized learning, shaping the culture, structure, and pedagogy, that allow students to play an active role in their learning and achieve this broader definition of success.

Competency-based education is gaining momentum and visibility. Districts and schools turn to competency-based education for different reasons: to develop globally competitive graduates, to design schools that promote what is best for students, to achieve greater equity, to create a system of continuous improvement and learning, and to foster deeper learning. Furthermore, districts and schools are transitioning to competency-based education through different entry points and roll-out strategies, and they are in different stages of development within their local contexts. As a result, there is a significant variation in competency-based education across the country. To a degree, these differences can be traced to regional priorities and needs. However, many of the variations we see are generated by the depth of understanding of competency-based education and the breadth of implementation efforts. Leaders in the field share concern that these differences will lead to variations in quality, and that efforts to create competency-based systems will not, as a result, produce the desired outcomes for students or educators. Thus, as the number of districts and schools transitioning to competency-based education grows, so grows the concern about quality. And by extension, the concern about equity: if we do not implement competency-based education with quality, we have little reason to believe that it will achieve the goal of educational equity to which it aspires.

At the [National Summit on K-12 Competency-Based Education](#) in 2017, researchers and practitioners recommended that a logic model be developed to catalyze a shared understanding of competency-based education. In response to this recommendation, the framework and logic models provided in this paper seek to describe a fully developed competency-based education system. They draw upon multiple bodies of research literature, as well as input from local and national practitioners in the field of competency education. The picture of competency-based education described here is of a fully implemented high-quality system. It is aspirational, as it describes a state that most systems have not yet attained. It is also real, as it is grounded in bodies of knowledge that show why implementing competency-based education with quality can lead to greater educational equity.

What is a Logic Model and What Does It Tell Us?

Logic models are tools used to conceptualize organizations, programs or strategies to bring about change and to support the evaluation of effectiveness. This paper uses logic model frameworks to convey relationships of essential levers (outcomes, drivers and mediating factors) that inform the design of competency-based education systems at four interdependent levels (student experience, professional practice of educators, district and school systems and culture). The logic models presented here are intended to help researchers and practitioners understand the critical components of competency-based education at multiple levels of practice.

We believe it is necessary to clarify a shared definition of quality that establishes common elements of competency-based systems applicable across contexts, while also honoring diversity of approaches that exist. In this spirit, the logic models shared here are not intended to dictate a single, overarching model for the field. Rather, they seek to describe common elements of practice necessary for quality implementation and continuous improvement. We do *not* prescribe specific approaches to designing and implementing competency-based systems, but rather recognize that districts and schools make different design choices based on the mediating factors of their local contexts and student population.

Different stakeholders — researchers, practitioners and the broader field — express different needs from a comprehensive framework and logic model. A model that tries to meet all needs would wind up not meeting any of them well. As a result, we made five trade-offs. We share these with you to help you understand what you will find in this paper and what you will not.

Aspirational v. Current State: A few districts are on their way to becoming fully developed competency-based systems. Most systems, though, are still deep in the work of exploring what personalized learning and competency-based education will look like in their individual contexts. Even the most developed competency-based districts and schools will declare that they are still in the process of learning, refining and improving.

In other words, the field of competency-based education is evolving and no one has it all figured out. There are several reasons for this. First, competency-based education is a paradigm shift. It requires that people deconstruct many inherited beliefs and embrace new ones. This doesn't happen overnight. Second, building capacity for competency-based education — supporting teachers, leaders and students to develop the knowledge, skills and competencies required of this new paradigm — also takes time. Finally, districts and schools are operating under state and national policies that uphold the traditional system, such as accountability policies and age-based assessments. Thus, many districts and schools are forced to keep a foot in both worlds rather than making decisions solely in alignment with competency-based education and what they believe is best for students.

If we were to use the current state of the field for determining the logic model, we would be level-setting in the midst of a dynamic change process, and we would be limiting the potential of competency-based education. Thus, we have made the choice to articulate an aspirational description, a North Star, of what competency-based education can and should entail. We know that while well-developed examples of each competency-based design element can be found in districts and schools around the country, this vision does not yet exist in once place. We hope that the logic models provided here can help districts and schools assess where they are in their development, identify opportunities for improvement and mid-course correction, and develop long-term plans to continue deepening and enhancing their practices to achieve quality.

Logic Model v. Theory of Change: Leaders and teachers don't just want to know *what* to do, they want to know *how* to do it and *how* to travel the path from "here" to "there." As a result, there is high demand for guidance on implementation strategies. However, we made the decision that clarifying the endgame is a necessary first step. Before we can describe entry points and implementation pathways, we have to all agree on where we are going and what a high-quality education system looks like. Therefore we do *not* intend for this paper to serve as an implementation playbook. While understanding competency-based education more deeply will help practitioners implement, this paper does not describe implementation starting points, pathways or maturity spectrums. Educators can use this paper as a tool to build deeper understanding of competency-based education and as a basis for describing or assessing the robustness of implementation. Future publications and learning communities may also build on this work to help educators and leaders chart the path.

What do you think is most important for creating a high-quality personalized, competency-based school?

Comprehensive v. Distinguishing: Many in the field seek to understand the distinguishing features of competency-based education: what makes competency-based education different than traditional systems. This is important, especially to establish how the traditional system systematically produces low achievement and inequity and, accordingly, why we believe it is imperative to move away from this model. For this reason, we identify the distinguishing features of competency-based education early in this paper. However, given that the goal of this paper is to contribute to improving quality, we made the decision to describe a fully developed competency-based system, one that includes what is different *and* describes essential elements of any high-functioning educational system. To think that distinguishing features of competency-based education are all that are needed to achieve high quality is incomplete; schools and systems working toward becoming fully competency-based must innovate *and* ensure that they demonstrate certain foundational capabilities of any and all high-functioning education system. The key difference, of course, is that “high-functioning” traditional schools and systems are unlikely to achieve equity, however high their performance as defined by traditional measures. Systems that allow students to advance with gaps in key knowledge and that do not prioritize real mastery of holistic success skills are unlikely to actually prepare students for the future or close equity gaps.

Complex v. Simple: Simplicity can offer clarity and shared understanding. But, the process of learning and teaching is complex as are the dynamic designs of schools. In this paper we attempt to balance simplicity and complexity. We offer a high-level description of the framework in its entirety, explaining each component and how they relate. Because detail is necessary to truly elucidate the richness of competency-based systems, we also offer granular detail at all four levels of practice — student experience, district and school systems, professional practice and culture.

Personalization and Competency-Based Education: The focus of the framework and logic models described in this paper is primarily illustrating competency-based education. However, competency-based education and personalized learning² go hand-in-hand: they are mutually reinforcing, and in many cases inextricable. Highlighted throughout the paper are aspects of personalization necessary for competency-based education systems to ensure that students build independent learning skills, receive the instruction and support they need to fill gaps in knowledge and skills, and progress at an appropriate pace toward building the knowledge and skills they will need for college, career and life.³

How Is This Paper Organized?

The remainder of this paper is organized into five sections that are best read sequentially.

Section II: We describe the most important distinguishing features of competency-based education so that readers can recognize those elements within the framework provided.

Section III: We offer a high-level overview of the entire logic model framework.

Section IV: The levers used to design competency-based education are described.

- How an expanded definition of student success shapes the design of competency-based education at all levels;
- How learning sciences and the pursuit of equity inform competency-based education systems at all levels; and
- How the mediating factors of student population and local context contribute to variability in competency-based education systems across the country.

Section V: We describe and discuss logic models and the critical elements of competency-based education at four interdependent levels of practice.

- How the student experience in competency-based education systems supports student success;
- How professional practice supports student success;
- How school and district systems support student success; and
- How culture supports student success.

Section VI: We offer suggestions for how this framework and logic model can be used in building further knowledge.

Over time the knowledge about competency-based education has expanded. The framework presented in this paper describes the current understanding of what a fully developed competency-based system would look like. To fully understand this depiction, it is valuable to discern features that distinguish competency-based education from traditional education. Ten distinguishing features, beginning on the next page, offer fruitful areas of dialogue to help examine the distinct purpose, rationale, beliefs and practices that are the foundation of competency-based education. In short, discussing the distinguishing features that separate competency-based education from the traditional system can help leaders and teachers prepare for and navigate the the shift from one paradigm to the next.

TEN DISTINGUISHING FEATURES OF COMPETENCY-BASED EDUCATION



Student success outcomes are designed around preparation for college, career and lifelong learning. Traditional systems narrowly prioritize and measure academic skills, often at the lower levels of Bloom's taxonomy. Competency-based systems emphasize ensuring that students can apply academic knowledge and skills to new contexts and become adept problem-solvers and independent learners. Thus, competency-based districts and schools align around academic knowledge, transferable skills and the ability of students to become lifelong learners. Culture, pedagogy, and structures are designed to develop student agency, build foundational academic knowledge and engage students in deeper learning that provides opportunities to engage in real-world problems.



Districts and schools make a commitment to be responsible for all students mastering learning expectations. While many traditional districts and schools have missions that purport to achieve "success for all," many of these same districts and schools maintain systemic practices that contribute directly to gaps in opportunity and inequitable academic outcomes. For example, when schools use grading practices that obscure and conceal students' actual learning levels, students do not have the information they need to improve. When schools fail to support students in addressing critical gaps in knowledge and skill, students become increasingly burdened by learning gaps that accumulate and widen over time.

By contrast, competency-based districts and schools proactively challenge these practices and put in place alternative systems and structures that promote success for all. They portray student learning authentically and transparently. They meet students where they are and ensure they have mastered key content. Importantly, they become flexible in using time, resources and student supports to ensure that students continue progressing toward success. Commitment to mastery for all requires districts, schools and educators to challenge and "unlearn" parts of traditional education as we know it, and embrace collective accountability, continuous improvement and personalization instead.



Districts and schools nurture empowering, inclusive cultures of learning. It is well-known that school culture is important to creating high-performing schools. However, the traditional system tends to emphasize order, safety and high achievement. Although high achievement is a shared value between competency-based and traditional systems, the interpretation of achievement is different. Traditional schools privilege students that are already at grade level by ranking and sorting students based on grade point average or other similar mechanisms. Traditional systems often emphasize order and compliance, manifesting in school disciplinary policies that exclude students, disproportionately impact students of color and contribute to students feeling that they do not belong.

Competency-based schools create cultures that emphasize growth, inclusion and empowerment for students and adults. The culture of competency-based education is rooted in the learning sciences, which emphasize maximizing safety and belonging, promoting active learning, developing skills to manage learning and cultivating intrinsic motivation. Districts and schools foster a growth mindset in

students and adults. Students are empowered to take ownership of their learning. Schools monitor student growth and pace. Distributed leadership structures empower educators to make decisions in the best interests of students. Equity lies at the heart of competency education to ensure that all students benefit, not just some.



Students receive timely and differentiated instruction and support. In traditional schools, students often have to fail before they receive support. Many times, these “supports” come in the form of remedial learning opportunities that are long delayed. In competency-based systems, schools develop schedules and mechanisms for students to receive additional support while they are struggling with new concepts so that they can continue to learn and build knowledge and skills. Formative assessment and effective feedback based on the learning objectives are essential to supporting students to learn, make progress and advance at a meaningful pace.



Research-informed pedagogical principles emphasize meeting students where they are and building intrinsic motivation. Many traditional systems seek to create aligned systems of learning and integrate the learning sciences into instruction. However, these systems sort and teach students based on their age, not on their actual learning needs and goals. Without falling into the trap of tracking, educators in competency-based schools begin with the concept of “meeting students where they are” and design instructional strategies for students based on their development, social emotional skills and academic foundations. They use these assessments of student learning and development to determine the supports that will be most effective in helping them learn and progress. Pedagogy and learning design for students and adults are grounded in the learning sciences and seek to embed equity strategies such as culturally responsive approaches and Universal Designs for Learning into the core of instruction. Helping students to build the lifelong learning skills often referred to as student agency is rooted in science of learning and one of the student success outcomes.



Assessments are embedded in the personalized learning cycle and aligned to outcomes including the transfer of knowledge and skills. Traditional systems place heavy emphasis on summative assessment, much of which emphasizes the lower portion of Bloom’s taxonomy: memorization, comprehension and application. All students take grade-level assessments at the same point in time. In competency-based education the emphasis is on assessment for learning. Formative assessment is deeply embedded in the cycle of learning to provide feedback that helps students master learning objectives and guides teacher’s professional learning. Students continue to practice or revise when they are “not yet” proficient until they reach the commonly defined performance level that demonstrates mastery of learning expectations. Students are empowered and engaged when the process of assessing learning is transparent, timely, draws upon multiple sources of evidence and communicates progress. In the most developed competency-based schools, summative assessments are used based on the personal pathway of students, not grade level, as a means of quality control and internal accountability to ensure that students are being held consistently to high standards.

Assessment systems in competency-based districts and schools also emphasize deeper learning. Districts and schools build the capacity for performance-based assessments to ensure students know how to transfer knowledge and build the higher order skills of analysis, synthesis and evaluation.



Mechanisms are in place to ensure consistency in expectations of what it means to master knowledge and skills. Variability is a feature of the traditional system: what is to be learned, what it means to demonstrate mastery, and how student work is graded will vary across districts, within schools, and even within classrooms. The result is that students are held to different expectations. It is also problematic because it is highly susceptible to bias: when teachers are the final arbiters of

student learning they may contribute — intentionally or unintentionally — to perpetuating inequitable outcomes for students. By contrast, competency-based education asks **How do we know if students have learned?** We cannot be confident that students are really developing the desired knowledge and skills if we are not confident that educators across the system measure them the same way. Moderation processes ensure teachers share expectations and understandings of standards. Similarly, teachers calibrate to ensure that they assess and grade evidence of learning consistently. Confidence in schools grows and equity is advanced when students, teachers and families receive clear and trustworthy information about exactly where students are on the pathway toward graduation.



Schools and districts value transparency with clear and explicit expectations of what is to be learned, the level of performance for mastery, and how students are progressing. A transparent common learning continuum, including standards and competencies that reflect the student success outcomes, establishes shared expectations for what students will know and be able to do at every performance level. Students are more motivated and empowered when learning targets and expectations of mastery are clear, and when they have voice in how they learn and demonstrate proficiency.



Strategies for communicating progress support the learning process and student success. In traditional systems students receive periodic report cards with A-F grades based on points for assignments, tests and behavior. Teachers often have their own system of grading, which results in variability in determining achievement. There is little opportunity for revision, a critical part of the cycle of learning, and students are ranked using the status of their performance. The problem is that risk-taking, failure and revision are part of real and authentic learning processes. Traditional grading systems create disincentives to these aspects of learning because they penalize failure. Grades in the traditional system may reflect knowing, but they do not necessarily reflect learning.

In competency-based districts and schools, grading systems are rooted in the learning sciences. Failure and mistakes are part of the learning process. The transparent common learning continuum is the backbone for the system of grading. Students are clear on what they need to learn, what proficiency looks like, and the ways they can demonstrate learning. Grading policies separate academics from behaviors and lifelong learning skills to ensure transparency and objectivity, with students receiving effective feedback and guidance on both. Students are expected and supported to engage in additional practice and revision until they can demonstrate proficiency.



Learners advance based on attainment of learning expectations (mastery) through personalized learning pathways. In traditional schools, students advance to the next set of content and the next grade level whether or not they need more time to master the content. Likewise, students are expected to engage with grade-level content whether or not they have already mastered that content. Pacing guides tell teachers to move forward in the curriculum even if students have not learned what they need to.

Competency-based systems recognize that students may need more time to learn concepts and skills deeply. If they have gaps in their mastery, scaffolding may be required to attain all the prerequisite knowledge and skills. More instructional support and time are provided if needed and students advance when they are ready. Depending on the domains and learning targets, students may be able to pursue personalized pathways forward rather than linear progressions. Competency-based systems ensure students are truly prepared for future learning by basing progress and credit accrual on demonstration of knowledge and skill, rather than the traditional system's dependence on proxies for learning, such as attendance or amount of time in class.

Comparison of the Traditional Education System with Competency-Based Education (CBE)

	Ten Flaws of the Traditional System	Distinguishing Features of CBE
OUTCOMES	Focuses on a narrow set of academic outcomes emphasizing academic skills, memorization and comprehension of content. Fails to recognize that student success is dependent on a full range of foundational skills, including social-emotional skills, and the application of skills.	Focuses on a broad and holistic set of student success outcomes that include deep understanding of content knowledge and skill demonstrated through application, and competencies that prepare students for college, career and lifelong learning.
MINDSET	Based on a fixed mindset: that people's abilities are innate and immutable. Ranks and sorts students creating "winners" and "losers," perpetuating patterns of inequality in society.	Builds upon a growth mindset: that learning and performance can improve with effort. Demonstrates belief that all children can learn with the right mix of challenges and supports. Takes responsibility for all students mastering learning expectations. Requires shared vision, collaborative approach, flexibility to be more responsive and commitment to continuous improvement.
CULTURE	Emphasizes compliance and order in school culture. Relies upon a bureaucratic, hierarchical system that perpetuates traditional roles, cultural norms and power dynamics.	Nurtures empowering, inclusive cultures of learning. Values agency for students and adults with distributed leadership. Recognizes safety and belonging is important to learning.
SUPPORTS	Targets supports to students when their academic or behavioral needs are identified as significantly above or below the norm (i.e. SPeD, gifted and talented).	Designs to provide timely and differentiated instruction and support. Provides daily flex time and time for students to receive additional support before and after semesters.
PEDAGOGY	Delivers a single curriculum to all students based on age. Emphasizes covering the curriculum each year. Fails to ground learning and teaching in the learning sciences - what we know about how children learn.	Draws upon learning sciences to inform pedagogical principles for students and adults. Takes into consideration student pathway in designing instruction. Increases motivation, engagement and effort through research-based strategies.
ASSESSMENT	Emphasizes assessment for summative purposes to verify what students know. Conducts one-size-fits-all assessments at predetermined points of time or at the end of the unit and are administered to all students at the same time and in the same format on the same content.	Embeds assessment in a personalized learning cycle and aligns to outcomes including the transfer of knowledge and skills. Clarifies students' next steps for individual learning pathways. Informs educator professional learning. Aligns assessment with the expectation that students will be able to transfer knowledge and skills to challenging new contexts.
RELIABILITY	Permits high degrees of variability in how educators, schools and districts determine proficiency. Students are held to different standards within courses, schools and districts.	Ensures consistent expectations and definitions of what it means to master knowledge and skills. Builds educator capacity to calibrate judgments of student mastery and hold all students to the same high standards. Ensures calibrated grading practices.

Comparison of the Traditional Education System with Competency-Based Education (CBE)

	Ten Flaws of the Traditional System	Distinguishing Features of CBE
LEARNING INFRASTRUCTURE	<p>Offers opaque learning objectives and performance expectations with limited information for students about the learning cycle.</p> <p>Students receive grades with little guidance on what is needed to do to better opportunities for revision. Varies in teacher expectations of what high achievement means.</p>	<p>Values transparency with clear and explicit expectations of what is to be learned, the level of performance for mastery, and how students are progressing. Provides measurable learning targets and proficiency is transparent to students.</p>
GRADING	<p>Uses academic grading practices that can often send mixed messages and misleading signals about what students know by reflecting a mix of factors, including behavior, assignment completion and getting a passing grade on tests, not student learning.</p>	<p>Communicates progress in ways that support the learning process and student success.</p> <p>Closely monitors growth and progress of students based on their learning pathway, not just grade level. Designs grading and scoring to communicate with students about their progress in learning academics, transferable skills and building blocks of learning.</p>
ADVANCEMENT	<p>Is time-based. Batches students by age and moves them through the same content and courses at the same pace. Advances students to the next grade level after a year of schooling regardless of what they actually learned.</p>	<p>Advances students based on attainment of learning expectations (mastery) through personalized learning pathways. Provides instruction until students fully learn the concepts and skills and then advance after demonstrating mastery. This requires additional support, not retention.</p>

What beliefs and assumptions support each of the distinguishing features?

Which of the 10 distinguishing features has your district or school begun to implement? Why? What challenges are you discovering?

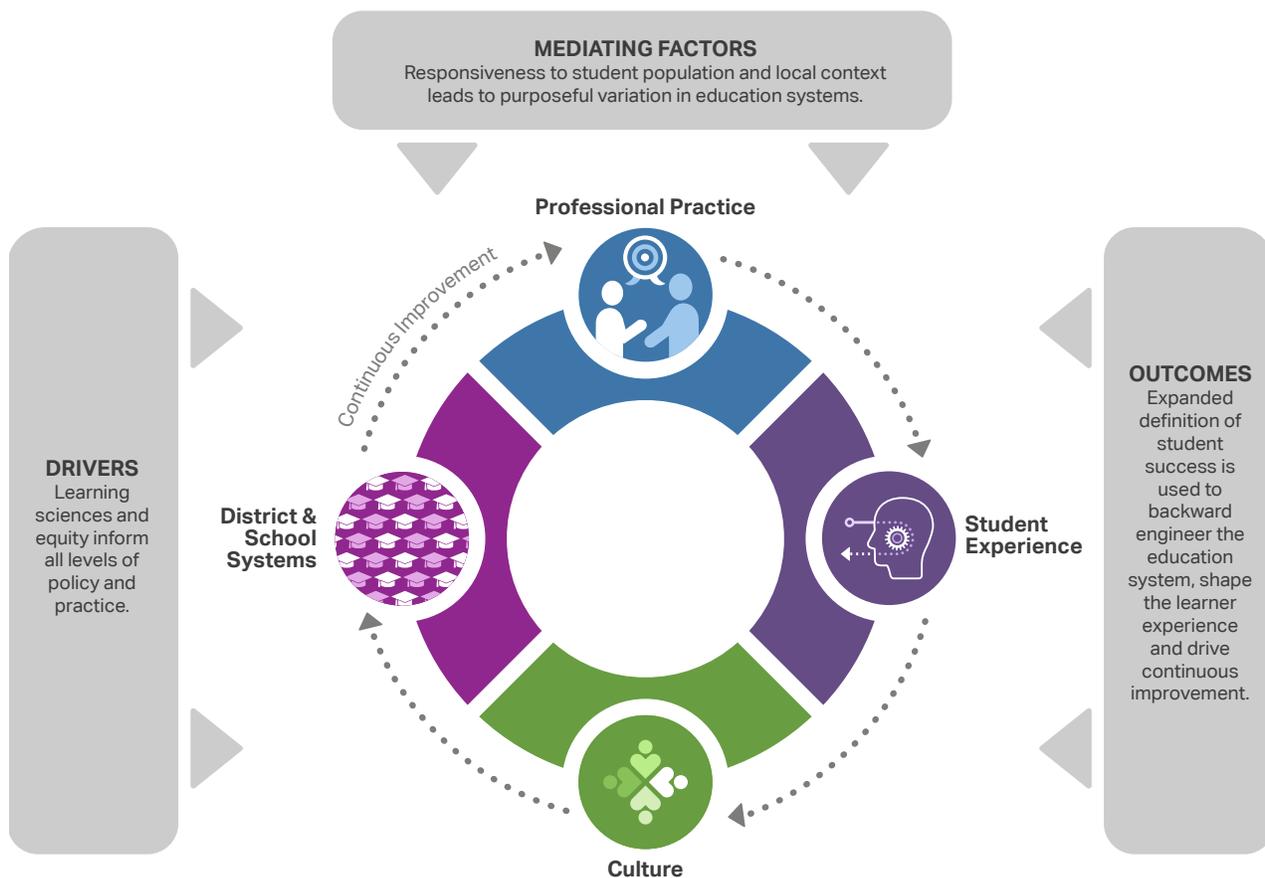
Which of the 10 flaws of the traditional system are the most difficult for you to address or eliminate? Why?

The question of how to determine if a school is competency-based or not is frequently raised. Although a reasonable question in the early stage of trying to understand competency-based education, it is difficult to discern because these distinguishing features are likely to require significant capacity-building. These changes are more than any one school can implement in a year or two. Thus, districts and schools at this point should be considered in the process of transitioning to competency-based education. Furthermore, the attempt to classify districts and schools as competency-based or traditional is inadequate when contemplating what is required to fully develop quality systems that benefit students. Thus, we would like to challenge the binary framing that assumes a school is either competency-based or traditional. Drawing upon the culture of competency-based education, which is developmental and growth-oriented, it might be better to ask ***In what way is a school competency-based?*** or ***What elements of a competency-based system are fully in place?*** Going forward, research may be helpful in identifying which of the distinguishing features are more powerful in the process of transformation, engaging and motivating students, and producing improved achievement.

III. A Framework for Competency-Based Education

This section provides an overview of the overarching framework for competency-based education. We describe the relationships between **levers** (outcomes, drivers and mediating factors) and **logic models** (student experience, professional practice, district/school system and culture).

- Outcomes are what we want to be true for all students. They are used to “backward engineer” all elements of competency-based systems. And, they represent the end result of successful systems.
- Drivers are evidence-based bodies of knowledge that are used to consistently design all levels of practice and reduce variation in quality. In competency-based education the main drivers are the learning sciences and the pursuit of equity.
- Mediating factors such as student demographics and local context are used to tailor all levels of practice. They produce valuable variations in the design of systems.
- Logic models depict the specific elements of culture, pedagogy and structure that make up the student experience, professional practice, school and district systems and culture in competency-based systems. All elements described are components of comprehensive, quality implementation.



A. Levers

We do not design educational systems in a vacuum. We design them based on what we want to be true for students, our knowledge about how students learn and what is necessary to ensure all students learn, and conditions specific to our local context. In this section we describe three types of levers that inform the design and implementation of competency-based education systems so that they can achieve quality.

Outcomes: New Definitions of Student Success

Graduation requirements, learning outcomes and learning measures have substantial influence in determining how schools are organized. Outcomes and measures shape how students experience learning through the selection of content, instructional strategies and assessments. Traditional models tend to emphasize lower levels of Bloom's taxonomy: they expect students to prove basic recall and comprehension of content knowledge aligned to grade-level standards. Competency-based systems emphasize: balance between broad content knowledge and enduring understandings of key concepts and skills; ability to apply and transfer knowledge and skills to meaningful problems and contexts; and skills, dispositions and habits that contribute to lifelong learning.

As districts and schools come to deeply understand this expanded definition of student success, they will find it necessary to make very different decisions about student experiences, instructional strategies, district policies and the culture of learning. It is helpful to think about the role of outcomes with regard to systems design in two ways. First, outcomes can be used to engage in backward design. When we know what we want to be true for students in their adulthood, we can define graduation expectations, critical learning and developmental milestones and ways to assess readiness and progress. Second, outcomes can be used to frame how we think about students' experiences throughout the process of learning. We can use our understanding of student success to inform what students experience at different points in their learning and what supports they need at different stages of their development.

Drivers: Learning Sciences and Equity

We think of drivers as key "learning levers." They describe bodies of research about how people learn and what is needed to promote equity, and they help us understand how to use this research to make decisions about practice at all levels. This may sound like common sense, but an inventory of educational practice in traditional systems reveals a gaping chasm between research and practice. From a historical standpoint, the traditional system was built to promote efficiency,⁵ not to promote learning or equitable outcomes. And even though much has been accomplished to create greater access and opportunity within traditional systems, biases and inequitable practices continue to have harmful effects on the education that many students and their family's experience. Thus, to create an education system that is designed to help all students successfully learn, progress and build the knowledge and skills they need for the future, competency-based education is firmly rooted in learning levers:

- **Learning Sciences:** Aligning with what is known about how students and adults learn and develop; and
- **Equity:** Ensuring that all students' learning needs are met and the predictability of achievement based on race, income or other factors is reduced or eliminated.

Competency-based systems should embody the most current research about learning and enact practices that dismantle structural barriers to equitable opportunities and outcomes. As leaders and communities embark on the path to become competency-based, it is imperative that they understand these drivers and use them to evaluate progress.

Mediating Factors: Student Demographics and Local Context

Community context influences districts and schools: how they are organized and how they make decisions about practices, structures and policies. Intentionally considering the broader context including the opportunities and challenges it provides will lead to improved quality. Responding to the community context enables districts and schools take advantage of assets and seek strategies to respond to the experiences of students and their families. There are two mediating levers to consider in competency-based systems.

STUDENT POPULATION

Competency-based systems embrace the idea of meeting students where they are in their learning and development, culture and life experiences. Districts and schools consider their student population as they design strategies that will lead to student success. Pedagogy, student supports and resource allocation are all informed by the student population. Districts and schools develop multiple strategies to value the culture, community and life experiences of students and their families including setting the direction.

LOCAL CONTEXT

In considering the local context in designing high-quality competency-based systems, the history, cultures and institutions within the community must be taken into account, including the economic and workforce dynamics. In addition the education sector — state and federal education policies, funding and resources, the strengths (and weaknesses) of improvement efforts, and the availability of technology — will need to be considered. Competency-based approaches are customized to local context to ensure they are effective and relevant to communities, and implementation is feasible, effective and sustainable.

All three design levers — outcomes, mediating factors and drivers — are critical for quality and equity. Ask yourself this: Why would a school dedicated to ensuring that every student masters the academic knowledge and skills needed for college and career use anything but research-informed school design strategies and instruction? Could a district or school that doesn't embrace equity at the core of its decisions be considered on the path to creating a system in which every student masters the core graduation expectations? Schools and districts embarking on the pathway to becoming competency-based should begin with clarifying their understanding of these drivers, and working with their communities to understand how the drivers can be used to inform all levels of practice: student experience, professional practice, district systems, and culture.

Our entire transformation started with the communities and school board challenging us — they wanted to know why their children were not reading at grade level. We were not effective in helping our children to learn the basics or preparing them for success in their lives, and we had to find a way to overcome that.

Twenty years later, we are thankful for how our community guided us in the right direction by asking difficult-to-answer common sense questions. Their description of what they wanted for their children helped us to understand we needed to approach students holistically. We needed to be able to prepare students for being successful in their lives — whether that was to live in remote areas, live in urban areas, go to college, work in a business, or create their own methods of supporting themselves.

I think the biggest mistake that districts moving toward performance-based systems make is that they skip the community engagement piece.

To community members, it quickly becomes “your system” and not “our system.” Too many districts glance through that step, and it always comes back and bites them. When we transform our schools to a personalized system, we have to start with being community-based.

– Dr. Bob Crumley, former Superintendent, Chugach School District, AK, 2014⁶

B. Logic Models

Logic models are frameworks that bring clarity to change efforts by visually presenting strategies that are likely to bring about desired results. The system that supports adults to help students to learn is inherently complex because the process of learning and teaching is tremendously dynamic. Describing competency-based education adds more complexity as it involves paradigm shifts and new expectations. Competency education raises the bar by designing for: every student mastering learning objectives including backfilling missing skills; providing timely and differentiated supports to ensure students are progressing; opportunities for students to apply what they are learning and developing the skills for independent learning. To manage this complexity, four interrelated logic models were developed. The logic models help practitioners break down complex domains of practice into their specific components to build deep understanding. However, we know that in the daily process of helping students learn, these components of practice are almost impossible to isolate.

Student Experience of Learning

Competency-based systems put students at the center of learning, teaching and operations. They begin with clarity about what students need to experience to continuously develop and to be ready for success in college, career and life. The student experience logic model depicts core elements of learning, teaching and assessment. It focuses on the student experience by identifying and describing the design features, instructional strategies and assessment practices that shape purposeful, personalized, supported, challenging and empowering learning. The logic model does more than describe *what* the student experiences, it describes *how* core components of instructional design and practice shape these experiences. Furthermore, the model seeks to explain how these designs and practices align to what is known about learning including the cognitive, interpersonal and intrapersonal processes that result in student success. It explores how these processes respond directly to each students' unique motivations and learning needs, and how they contribute to student success.

Professional Practice

Professional practice shapes the student experiences that contribute to student learning and development. The professional practice logic model describes what teachers do to promote student success while also recognizing that as students build the skills to take ownership of their learning, teachers and students will share power in design and decision-making. The logic model also recognizes that professional practice is comprised of more than "what teachers do." It includes creating professional culture, adult learning and systems to support instruction and assessment. These core elements of professional practice align with expectations for student learning so that there is coherence between adults' and students' experiences. In competency-based systems, students and teachers are learners, and their learning processes are integrally related.

District and School System

Schools, districts, statewide organizations, charter management organizations and other educational networks shape and sustain the student experiences and systems of professional practice that contribute to student success. The district and school system logic model, introduced on page 37, identifies core elements that enable competency-based education at all levels. These elements promote coherence and consistency across the education system while allowing the flexibility necessary for contextualized practice at the student, classroom and school levels. The logic model is designed so that it can be understood by leaders at multiple levels. In other words, a superintendent, principal, or state department of education administrator should all be able to use the logic model to define and understand core elements

IV. The Levers of Competency-Based Education

Levers shape the design and implementation of competency-based education systems. When schools have developed and explored the implications of the levers they can begin to design an intentional and aligned system. The levers influencing competency-based education are:

- what we want to be true for students (outcomes);
- what we know about the way people learn (learning sciences);
- what is required to achieve equity so that demographic characteristics are no longer predictors of achievement (equity);
- who our students are (student population); and
- what is specific to our particular local communities (local context).

Levers are, for the most part, external factors and forces: they are defined beyond the scope of any one school system. In other words, districts and schools do not, on their own, define research on human cognition or forces affecting what it means to be ready for college and career or the local community demographics. Rather, districts and schools must understand these factors and forces and then determine their implications for educational practice at all levels. They will find that levers drive how they make design decisions, negotiate trade-offs and prioritizations, and direct resources of personnel, capacity, time and money.

It is valuable to recognize that some levers contribute to consistency across competency-based education systems: districts and schools should show some commonality because they are all designing with careful attention to student success, learning sciences and equity. Student success will drive alignment of instruction, assessment and operations. While outcomes may look slightly different across districts and states based on factors like differing graduation outcomes and differing local visions for a graduate, all districts and states should reflect common understanding of what it means to be ready for college, career and life. And, it is expected that all competency-based districts and schools will seek to take advantage of research related to how people learn and what is needed to achieve equity in education.

Other levers are mediating factors that shape variation across competency-based education systems. When districts and schools respond to community needs with intentionality, they optimize their practice for the students and families they serve. It is important to note that districts and schools must manage this variability by maintaining transparent, shared understanding of design “guardrails,” such as shared definitions of student success, learning sciences and equity research. In other words, designing for your local context does not mean you can ignore research about how people learn.

A. Outcomes: New Definition of Student Success

Definitions of Student Success

Competency-based systems are based upon two essential beliefs. First, that students will need a broad set of knowledge, competencies and dispositions to succeed in college, career and life. Second, that all students are capable of demonstrating this expanded definition of success when the right supports are in place. These two commitments distinguish competency-based education from the traditional paradigm, which continues to use a narrow definition of success to separate and sort students. We recognize that states, districts and school communities will want to come together to define the common expectations they will hold for students. At the same time, there are substantial bodies of literature that articulate what students need to know and be able to do to be successful. (See **Figure 1. New Definitions of Student Success**) In this framework, we articulate the common elements of student success that research suggests are important, while anticipating and encouraging local systems to define how these elements will be operationalized, articulated and enacted in their context.

Most traditional systems emphasize broad coverage of academic content and determine student success based on basic proficiency and/or credit completion. However, student success is more than a number of credits or proficiency on a state exam. Research across multiple fields shows that success in college, career and life demands transferable skills and the skills and dispositions that promote lifelong learning. Thus, competency-based systems emphasize deep understanding — what some call deep conceptual understanding in keystone concepts.⁸ Enduring understandings allow students to apply and transfer content knowledge and skill to meaningful problems and contexts, and also to future learning experiences.

When we first started talking about personalization, some people didn't understand why. They saw it as 'we aren't good enough.' But that wasn't the case at all. We are changing because we can do better, not that we are failing. Trust between a district and the community, between schools and parents, begins with the belief that we are doing the very best for students. Many of the traditional measures of success were set in a time when few attended college, when knowledge was less accessible to all. The context has changed, so must the measures of success.

- Patricia Deklotz, Superintendent and Theresa Ewald, Assistant Superintendent, Kettle Moraine School District, WI, 2017⁷

What is the definition of student success your district or school uses to describe what students should know and be able to do upon their transition or graduation from your school? How was this definition created, and who was involved?

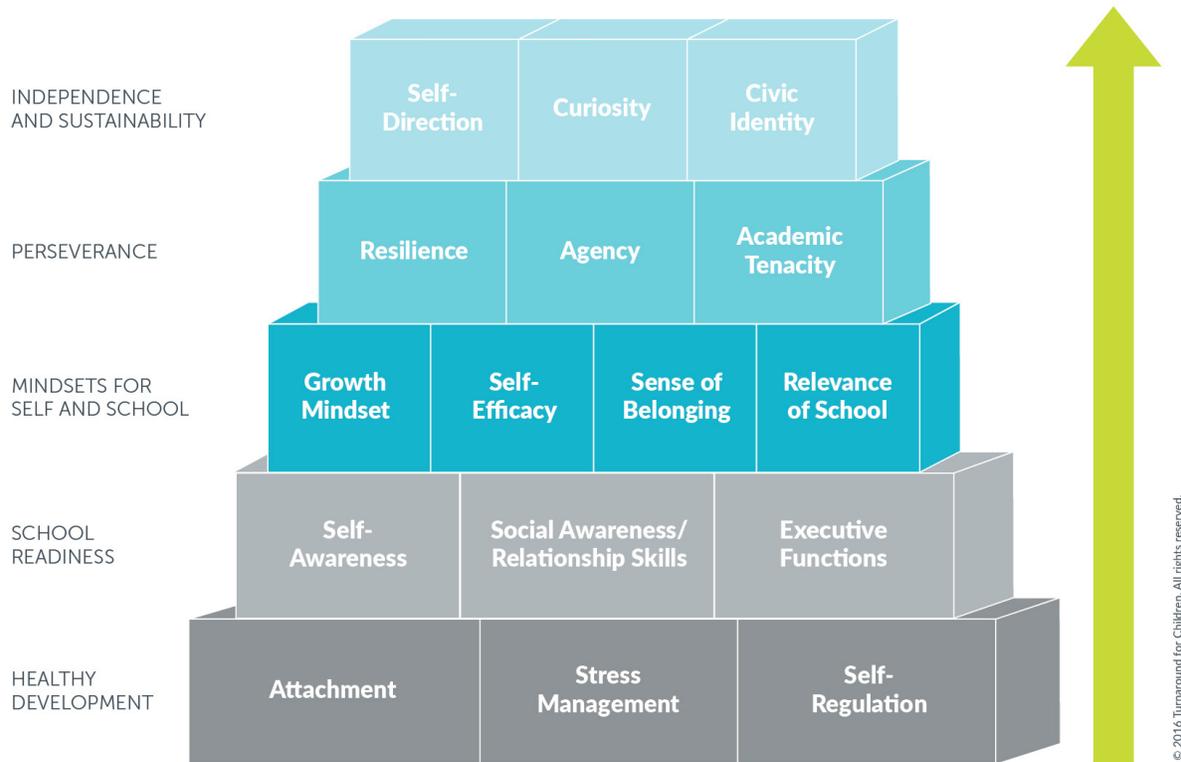
Does your definition reflect your community's values? Does it reflect what we know students will need to know and be able to do to succeed in college, career and life?

Figure 1. New Definitions of Student Success

Academic Knowledge, often referred to as content, are the set of facts, concepts and processes used in the domains students are expected to learn in school including but not limited to mathematics, English language and literacy, natural sciences, social sciences, the arts and technical subjects. State, district and school policy define the domains and expectations for performance that students are expected to learn in school.

Transferable Skills are the adaptive expertise and abilities that enable people to effectively perform roles, complete complex tasks, or achieve specific objectives. Successful young adults have sets of competencies (e.g., critical thinking, problem-solving, creativity, collaboration) that allow them to be productive and engaged, navigate across contexts, perform effectively in different settings and apply knowledge to different tasks. Some or all of these skills or competencies may be referred to as transferable skills, higher order skills or 21st century skills.

Lifelong Learning Skills that prepare students to be independent learners are based on the *Building Blocks for Learning*⁹ including healthy development, social & emotional skills, mindsets, perseverance, and independence. Related terms are intrapersonal skills, student agency or non-cognitive skills.



Source: Building Blocks for Learning from Turnaround USA. Reproduced with permission.

In addition to emphasizing mastery of key academic knowledge and skills, competency-based systems recognize and purposefully develop the competencies that students will need for college, career and life. Substantial literature points to the breadth of skills and abilities that people need now and will need in the future to navigate increasingly complex and dynamic environments. As some put it, we are preparing students today for classrooms, jobs and global contexts that do not yet exist. Different states, districts and school systems will define these competencies using slightly different terminology. Some variation is appropriate, as local systems will want to think about the social, economic and political contexts that are most relevant for their students and communities. That said, it is important to define some common language and understanding across the field about what we mean when we say “ready for college, career and life.” To help provide this cohesion and clarity, we suggest that all definitions of transferable skills should emphasize certain commonalities: critical thinking, complex reasoning and problem-solving, teamwork and communication. These competencies are as critical to student success as academic knowledge and skills, and they require equal levels of commitment to ensuring that all students develop them.

To what extent are your school design, pedagogy and operations aligned with the definition of student success? In what way aren't they aligned?

If we are preparing students for classrooms, jobs and global contexts that do not yet exist, we must admit that we cannot possibly define everything students will need to know and be able to do in the future. As important as it is that we equip them with key knowledge, skills and competencies, it is as critical that we equip them with the mindsets, skills and habits that will enable them to continue learning and adapting to the constantly evolving dynamics of the lives they will lead. The terminology of “lifelong learning” is broad and, as with the term transferable skills described earlier, there is a risk that inconsistent or incomplete usage of the term will dilute its power and importance. While we anticipate some local variation, we suggest that lifelong learning must include growth mindset, metacognitive skills, agency and self-regulation skills. These abilities prepare students to navigate changing landscapes. Growth mindset means they believe in their ability to grow and improve with effort. Metacognitive skills help them set and monitor goals. Agency means they have the will and motivation to take purposeful effort in pursuit of their goals, Self-regulation skills mean that they can manage interpersonal and intrapersonal dynamics including emotion, behavior and cognition. These abilities also help students realize academic outcomes; a substantial body of literature proves the correlative and causal relationships between developing these mindsets and skills and successfully mastering academic learning.

In short, transferable and lifelong learning skills are not supplemental or secondary in competency-based systems. They are integral parts of a student's learning experience and outcomes.

COMMITTING TO SUCCESS FOR ALL LEADS TO A MASTERY ORIENTATION

To ensure all students achieve at high levels — academic knowledge, transferable skills and prepared for lifelong learning — requires a commitment to ensuring they master all content knowledge, skills and processes along the way. Mastery-based progression is essential to providing students with a solid foundation for the future. Visualize building a home: builders layer new levels of material upon older, building from the foundation to the first story to the second story to the roof. If they do not allow the foundation to set, skip sections of flooring, or use shoddy construction on load-bearing beams, they will build a home that at some point will crumble and fall. So it is with students: when students are allowed to advance without mastery — when they have proverbial “holes” in their learning — it is like building new layers of learning upon shaky foundations or continuing construction with missing sections of flooring and holes in the walls. Unaddressed gaps in a student's knowledge and skill will make each subsequent concept shakier, and cause learning gaps to accumulate over time.

Mastery-based progression is when each student's progress toward mastery is continually evaluated. Each student advances and earns credit based on demonstrating that they have mastered learning goals, and each student has the support they need to succeed. Competency-based systems are also unique in that they certify learning based on demonstration of mastery. To advance between tasks, units or learning levels, students demonstrate that they have actually mastered learning: that they know, can demonstrate and can apply broad content knowledge and enduring conceptual understandings, key skills and essential learning processes.

Some will hear this and worry that a mastery-based approach might require a rigid linear sequencing of learning or do an unintended disservice to students who need special supports or have pre-existing gaps. However, mastery based progression is not about limiting, retaining, stigmatizing or penalizing students. It is about taking responsibility for ensuring all students learn, acting upon the belief that all students can learn with the right supports, and helping students address and mitigate prior learning gaps, however large.

In Practice

Expanded definitions of student success may develop in many ways. States may create profiles of graduates. Communities may meet to define a vision of what they want for their children and community. Districts and schools may define and articulate competency frameworks that describe college, career and life competencies. No matter how they are created, using this lever intentionally requires districts and schools to reflect on the types of culture, school design and structure, learning experiences, instruction and assessment that is needed to develop these competencies.

Challenges and Realities

Districts and schools seeking to define student success broadly will face predictable challenges and decision points. For example, districts and schools will need to decide how to integrate or align academic standards with broader competencies, and how they will seek to measure competencies. In the current accountability system this can be challenging, as assessments, curriculum and teacher knowledge are all organized around grade-level academic standards. Many districts and schools will make a strategic decision to begin by building capacity around the existing standards that are well known to teachers. Although this is a realistic starting point and a common stage of implementation in the field, systems will eventually need to develop a framework or continuum of competencies and standards, develop the instructional capacity to meet students where they are, build capacity around performance-based assessments and create systems of supports for students.

Opportunities for New Definitions of Student Success Under ESSA

The Every Student Succeeds Act (ESSA) provides states with an unprecedented opportunity to transform K-12 education systems with new flexibility. The new law makes it possible for state leaders to start with a new definition of success that provides a more well-rounded education, redesign systems of assessments, accountability models and educator preparation and development systems that coherently align to and support more holistic student learning outcomes. Under ESSA, it calls for states to work with local communities and redefine student success — states have the potential to engage deeply with communities in conversations around the purpose of K-12 public education and what students should know and be able to do upon graduation. Conversations around new definitions of success can include academic competencies, social emotional competencies, skills and dispositions necessary for success.

- Adapted from iNACOL's *Redefining Student Success: Profile of a Graduate*¹⁰

Districts and schools will also predictably struggle with what it means to move toward mastery-based progression. Many policies and operational practices are not aligned to mastery-based progression, and the current accountability system incentivizes getting students to be proficient at grade level, sometimes at the expense of addressing key learning gaps. This is a complicated issue discussed in greater depth in the report *Designing for Equity: Leveraging Competency-Based Education to Ensure All Students Succeed*, which explores strategies related to progress and pacing.

B. Drivers: Doing What Is Best for Learners

The Learning Sciences

School systems must be designed, organized, and operated based on the most current knowledge we have about how individuals — students and adults — learn and develop. Although this may seem rudimentary, it is not commonplace. Most traditional systems fail to align learning and teaching, professional development, school design and operations and other key functions with what we know about learning. Competency-based education asserts that school systems should be organized around the robust set of research, on how people learn and develop, referred to in this paper as the learning sciences. Students and adults should have access to learning environments — in the classroom, in the community or online — that draw on the very best research from multiple disciplines.

Across many disciplines, the learning sciences are revealing new discoveries about how humans learn. In this paper, we seek to be inclusive in our understanding of the learning sciences while recognizing that different disciplines — including neuroscience, cognitive and psychological research — emphasize and prioritize different aspects of how people learn. We also recognize that as the learning sciences continue to develop and influence schools, it is important that we continue to critique the assumptions, understand the implications of research designs and consider new findings in the context of other research.

As with definitions of student success, we believe that it is important for educators to convene around key concepts of the learning sciences, rooted in evidence, that can inform the district operations, school design, instruction and assessment, professional practice and even state policy. The job of educators and leaders is to use these findings to design effective schools, learning environments, instruction and assessment. Therefore, we draw from the bodies of research to summarize critical cornerstones of the learning sciences.

Learning is very social and depends on the quality of the relationships between students and teachers. The size of the school is important. The multi-age structure allows these relationships to grow. Our teachers know our students more than a semester or a year. Our teachers really get to know the children and guide them in the journey. This is absolutely critical in helping students build the skills of independent learners.

- Patricia Deklotz, Superintendent, Kettle Moraine School District, WI, 2017¹¹

To what extent are your school's design and pedagogy aligned with the learning sciences? Which of the cornerstones of the learning sciences are driving the pedagogy in your district and school?

Which of the cornerstones of the learning sciences are the most difficult to integrate into your pedagogy? Why?

What strategies might you use to integrate learning sciences into your school's design and pedagogy? What challenges do you anticipate?

CORNERSTONES OF THE LEARNING SCIENCES¹²



Learning is an activity that is carried out by the learner.¹³ Students do not simply absorb information and skills. Rather, learning requires active engagement and effort. Effort is influenced by motivation. Similar to intelligence, motivation is malleable. Beliefs about intelligence shape the amount of effort students are willing to invest.¹⁴ Those who hold a growth mindset will put more effort toward learning than those who hold the misconception that intelligence is a fixed trait. Providing incremental opportunities to experience growth reinforces that effort will result in success. Learners will be more motivated when they value the task and if they are confident they will be successful with supports available if needed.¹⁵



Learning results from the interplay of cognition, emotion and motivation.¹⁶ The brain does not clearly separate cognitive from emotional functioning, so optimal learning environments will engage both. Motivation is important to learning but it is also dynamic and changes in response to a number of factors. In fact, as students learn more about their cognitive processes, they develop a greater sense of competence and thereby increase their motivation. The relationship between cognition, emotion and motivation is dynamic.



Learning does not occur through a fixed progression of age-related stages or regular patterns.¹⁷ Learning is shaped by multiple factors, some of which are related to the neural, social, and emotional development of children. Others are dependent on the types of experiences and contexts provided for the child to build new understanding on prior knowledge. Practically speaking, this means that biological factors are only a part of the story. Frequent challenges matched by socio-emotional support can strengthen cognitive and psychological development. Rich learning experiences facilitated by helpful guides along with recurring opportunities to experiment, practice and improve will help students learn, develop and achieve.



Intrinsic motivation leads to better long-term outcomes than extrinsic motivation.¹⁸ Extrinsic or controlled motivation (systems of reward or punishment such as the traditional grading system of 0-100 points for assignments and behaviors) may be useful in the short-run but often produces the unintended consequence of disengagement and resistance. Self-determination theory explains that motivation will increase when learners experience competence (I can be successful), relatedness (I have meaning and connection) and autonomy (I have control over the process).¹⁹ It's important to remember that motivation is dynamic: it increases and decreases, it can be shaped by cognitive processes, and external expectations can become intrinsic motivation.



Effort is dependent on motivation and self-regulation. When learners are able to self-regulate — when they can successfully manage thoughts, behaviors and emotions — they are better able to initiate and sustain focus and effort on difficult tasks. Students may be highly motivated but not have the skills necessary to manage the emotions they experience in the process of learning. Thus, students need coaching to build the social and emotional skills to manage stress they experience from situations in or out of school, the metacognitive skills to monitor their learning and self-regulation skills to change strategies as needed.²⁰



Learning is shaped by the way information is processed and transferred into long-term memory.²¹ New information is processed in working memory before it can be transferred into long-term memory. Working memory has limitations to how much new information it can absorb, requiring students and teachers to consider the cognitive load. Strategies can be used to reduce demand on working memory and helping to transfer new information and concepts into long-term memory.



Learning builds on prior knowledge and context.²² People learn new knowledge optimally when their prior knowledge is activated. Learners need to have structures to organize and retrieve information. Thus, attaching new information to what they already know in a context where that knowledge is accessible, relevant and responsive to cultural understanding can be helpful in mastering new ideas and skills.



Acquiring new knowledge and skills requires effective feedback.²³ Effective feedback focuses on the task (not the student) and on improving (rather than verifying performance). Assessing student learning, identifying misconceptions or gaps in understanding and providing feedback are critical steps in the learning process. Assessment information is as important to helping teachers to adjust their teaching strategies or improve their skills as it is for helping students adjust their learning strategies. Research on [learning progressions](#)²⁴ helps teachers to understand how students are understanding concepts and processes not just whether they reached the correct answer.



Learning is a social process.²⁵ Learning occurs in a socio-cultural context involving social interactions. Students need opportunities to observe and model behaviors — both from adults and peers — to develop new skills. Dialogue with others is needed to shape ways of thinking and constructing knowledge. Discourse and collaborative work can strengthen learning when they allow students to assist each other and take on expert roles.



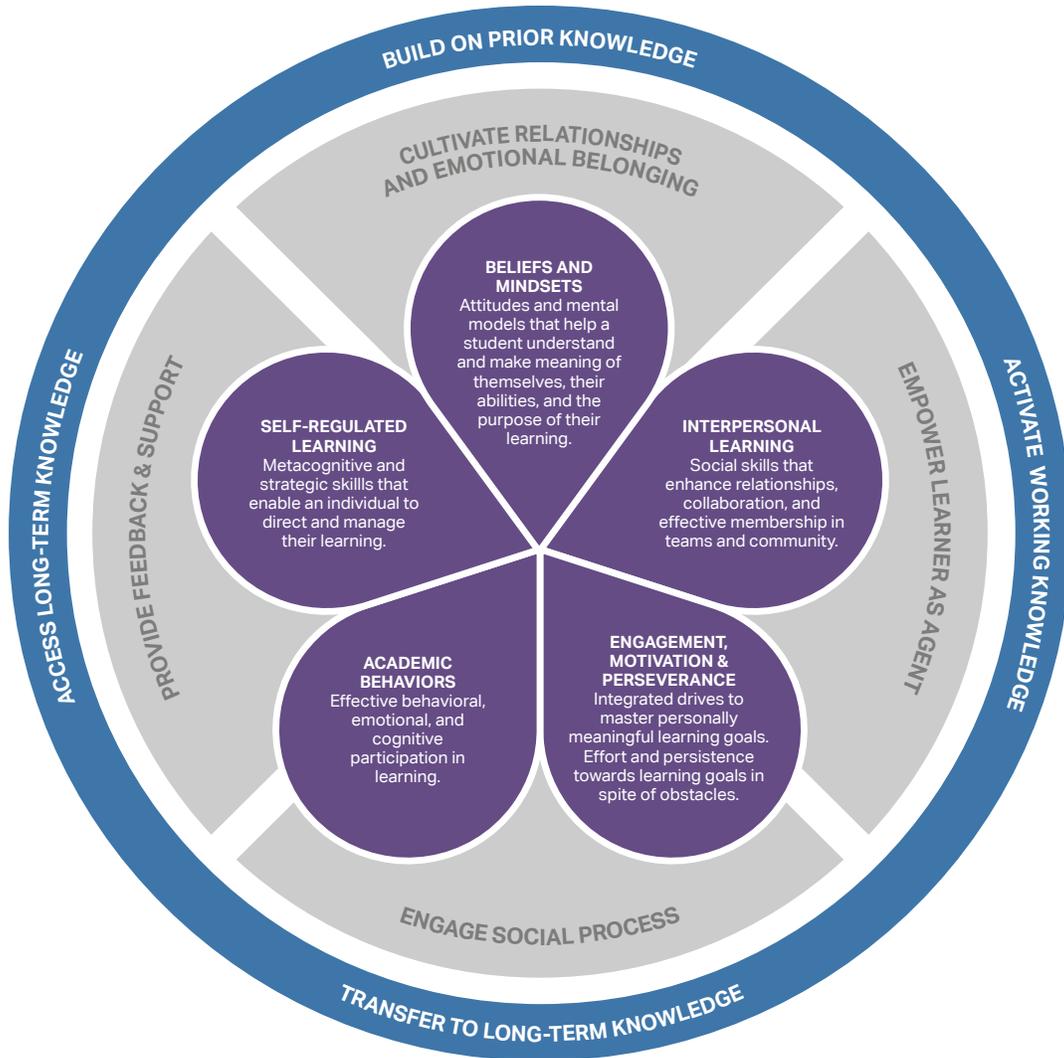
Learning occurs through interaction with one's environment. The human brain, and therefore learning, develops over time through exposure to conditions, including people, experiences and environmental factors. A person's culture may also serve as "context" that influences learning.²⁶ Learning occurs best in conditions that support healthy social, emotional and neurological development. Students will be more motivated in schools when they believe that they are accepted, belong and respected.²⁷ Optimal learning environments attend to and seek to ameliorate status differences and social hierarchies so that students do not feel marginalized, ostracized or threatened.

Cornerstones of learning sciences are critically important for designing student experiences, professional practice, district and school systems and culture in competency-based systems. In **Figure 2**, we offer a unified framework to help educators and leaders begin to understand the sciences more deeply, and to imagine and then implement strategies to actualize them through learning, teaching, assessment and operational practice. The outside ring is the "Cognitive Cycle of Learning" highlighting the cognitive processes of building on prior knowledge, activating working knowledge, transferring to long term memory and accessing long term knowledge. The middle ring is the "Learning Environment" constructed by teachers that cultivate relationships and emotional belonging, empower active learning, engage in the social process of learning and provide feedback and supports. The inner ring is the "Learning Mindsets and Skills" as they build the skills they need to learn the task before them as well as become lifelong learners: beliefs and mindsets; self-regulated learning; academic behaviors; engagement, motivation and perseverance; and interpersonal learning.

Five Misconceptions of How People Learn – *The Science of Learning*, Deans for Impact²⁸

- Cognitive development does not progress via a fixed progression of age-related stages.
- Students do not have different "learning styles."
- Humans do not use only 10% of their brains.
- People are not preferentially "right-brained" or "left-brained" in the use of their brains.
- Novices and experts cannot think in all the same ways.

Figure 2. How We Learn²⁹



Cognitive Cycle of Learning
 Learning Environment
 Learning Mindsets and Skills

Your Insights and Inquiries

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IN PRACTICE

The implications of the learning sciences for designing learning systems are many. We offer a few specific implications as a starting point.

- Prioritize developing student agency. Involve students in planning, monitoring and reflecting on their learning paths and experiences.
- Organize and design schools to maximize relationships between students and adults, utilizing features such as small schools,³⁰ advisory and multi-age bands.
- Ensure all students have the opportunity to experience cognitive rigor. Use personalized supports to ensure students are engaged within their zone of proximal development. Design incremental steps if needed to ensure students are experiencing success.
- Provide all students, regardless of their prior knowledge or current learning level, with the opportunity to experience and share mastery of meaningful content. Connect all new learning to prior knowledge and context. In particular, bring a lens of cultural responsiveness to ensure that knowledge and content respond to students' experiences and contexts.
- Use pacing and chunking strategies that allow students to transfer new knowledge into working, and then long-term memory. Personalize these strategies for students.

CHALLENGES AND REALITIES

The adage that there is a “gap between research and practice” holds true in education in a variety of ways and for a variety of reasons. First, the learning sciences are not singular. They are comprised of research across a variety of fields including cognition, psychology and neurological development. These sub-domains are rarely integrated and, as such, it can be challenging for practitioners to make sense of them as a whole. Second, knowing that emotion is important for learning does not equate to knowing how to use emotion to support learning. Teachers need support to understand how they can integrate learning sciences into their practice, and changes in practice do not occur without support, practice and feedback. Without changes to teacher preparation and development, it will be hard to integrate learning sciences into education systems with depth or consistency. Finally, there are structures associated with our current policy and accountability context that are contradictory to aspects of the learning sciences. It can be harder for teachers to prioritize ‘building on prior knowledge’ for students who are behind grade level when curricula and assessments are tied to grade level content, for example. It is not impossible to root learning in the learning sciences in such a context, but it may be more challenging.

Equity Strategies

Competency-based systems are explicitly, authentically and persistently dedicated to achieving equity: to dismantling systemic barriers to equitable access, opportunity and achievement. This commitment drives the design of competency-based systems at all levels, from individual relationships between students and teachers to system-wide resource allocation and policy. Although being equity-focused will look different in different systems depending on their unique histories and contexts, it is critical that the field convene around baseline agreements about what it means to advance equity.

How do you (or how might you) use data to identify where there may be bias or inequitable practices? What have you discovered and what strategies have you used to address them?

What are first steps you can take to address inequitable policies and practices? What mindsets and beliefs will need to shift?

CORNERSTONES OF EQUITY-BASED PRACTICE

As part of the [National Summit on K-12 Competency-Based Education](#), participants looked deeply at the issue of equity and what would be needed to ensure that competency-based education led to improvements in equitable achievement. This definition of educational equity developed by the National Equity Project was selected to guide discussion on equity as it powerfully reminds us that to reach equity, states, districts, schools, educators and communities must work work at three levels: systemically, organizationally within schools and classrooms, and as individuals.

What inequitable policies and practices may be negatively impacting student engagement, motivation and achievement in your district and school? Who are they benefitting and who are they harming?

According to the National Equity Project:³¹

Educational equity means that each child receives what he or she needs to develop to his or her full academic and social potential. Working toward equity in schools involves:

- *Ensuring equally high outcomes for all participants in our educational system; removing the predictability of success or failures that currently correlates with any social or cultural factor;*
- *Interrupting inequitable practices, examining biases, and creating inclusive multicultural school environments for adults and children; and*
- *Discovering and cultivating the unique gifts, talents and interests that every human possesses.*

Drawing from and building upon the National Equity Project definition, the following are 10 cornerstones of equity-oriented, competency-based systems.

ENSURE HIGH OUTCOMES



Recognize broader goals and purpose of education. Learning is not solely about academic proficiency, but is also about social and economic opportunity, socio-economic mobility, civic and democratic participation and personal and collective freedom and power. Alongside academic competency and wellbeing, equity-oriented systems prioritize student agency — the willingness and capacity to take purposeful action in support of one's learning, success and fulfillment — as an essential outcome of learning.



Promote accountability and transparency. When student learning, progress and pace are transparent, students and families are empowered to have agency in their learning. All aspects of the learning experience should be explicit and accessible to students and families to empower informed decision-making and continuous improvement.



Invest in continuous improvement. Continuous improvement represents collective commitment and accountability to ensure all students succeed. Equity-oriented systems respond and adapt to students to ensure every student's needs are met.

CREATE INCLUSIVE MULTICULTURAL SCHOOLS



Prioritize belonging and inclusion. Learning experiences must reflect and validate students' personal, and cultural identities and experiences to build positive identity and pride. They must promote awareness of, comfort working with and affiliation with other personal and cultural backgrounds different from one's own. Likewise, professional culture must respect and validate the personal and cultural identities of teachers and staff. Equity-oriented systems will seek to hire teachers and leaders who share their students cultural identities and life experiences, and to ensure that these educators have equitable opportunities for voice and leadership.



Engage in community participation and empowerment. It is important to harness the power of communities. Beyond transactional engagement, equity-oriented systems validate, elevate and integrate community voices in all aspects of design, implementation and improvement. They proactively and respectfully seek to include the voices of communities who have been historically excluded.

ADDRESS BIAS



Invest in adult culture and development. Adults must develop the mindsets, knowledge and skills necessary to become culturally capable, equity-focused practitioners. Districts, schools and educators must commit to continually examine beliefs and biases that may be affecting education and opportunities for students of color and other historically oppressed groups. They must promote a strengths-based approach, equitably high expectations for all and the belief that all students are capable of achieving high levels of academic success.

INTERRUPT INEQUITABLE PRACTICE



Confront historical and institutional oppression. Equity-oriented systems recognize, validate and seek to dismantle the dynamics of historical and institutional racial and socioeconomic oppression. They name and take proactive steps to correct the specific ways in which non-dominant communities have been marginalized.



Allocate resources through an equity lens. Resources — time, people and money — can promote or impede equity. Equity-oriented systems allocate and invest resources through an equity rather than an equality lens, focusing on need and accounting for historical practices of underinvestment and oppression.



Address disparities in resources, supports, care and expectations. Students, especially those who have been historically underserved in educational systems, may need additional resources and supports to thrive. Equity-oriented systems provide these supports to students, and perhaps also to families to ensure all have equal foundations for success, as well as the resources and opportunities to build on their natural strengths and abilities.



Ensure equal access and opportunity. Equity-oriented systems never sort or track students based on perceived ability. Furthermore, they address previous patterns of sorting and tracking by proactively creating opportunities for students to access rigorous learning opportunities and ensuring that marginalized students receive the supplemental resources necessary to access, engage and achieve success in rigorous learning opportunities.

A culturally responsive teacher must be willing to engage in deep introspection of personal biases and their impact on classroom instruction. Part of the job of the principal is to provide professional learning which will forward this work and elicit strategies to address the results of this introspection.

Because so few teacher preparation programs support pre-service teachers through this type of personal analysis, principals are left to guide their staffs through it. But, a principal cannot lead where he or she is not willing to go. School leaders must also engage in effective professional development to guide introspection of their personal biases and develop ways to work around them.

— Joseph Ellison, Principal, Martha Layne Collins High School, Shelby County Public Schools, KY, 2018

Educational equity is an aspiration, but it is not yet a reality. We are painfully aware that no single education system has succeeded, as of yet, in eliminating all disparities in outcomes by race, class and other forms of historical oppression. We are also painfully aware that many educational movements have promised equity. New programs, interventions, innovations, curriculums and school design philosophies have laid claims to their ability to remove opportunity and achievement gaps. We understand that this is damaging: communities who have long been underserved and under-resourced are let down and grow weary and leary of equity promises, while there are few to no repercussions for persistent failure.

We do not use aspirational language to make false promises about equity. We know that many competency-based districts and schools are still struggling to leverage competency-based education to achieve more equitable outcomes. We know that students and communities are still being let down. Rather, we include aspirational language about equity for three reasons. First, to establish common language about what we really mean when we say equity. Second, to establish connections between specific dimensions of equity and competency-based practice, helping leaders and teachers think about what it means to be truly equity-oriented. And third, to articulate a bold, compelling, compelling vision of what it would look like to be truly equity-based. Without a shared vision, we cannot know where it is that we are going.

We further explore many of these themes and how they are put into practice in [Designing for Equity: Leveraging Competency-Based Education to Ensure All Students Succeed](#).

C. Mediating Factors

Student Population

Student populations are characterized by individual and collective identities and histories. These may include, but are not limited to, race, gender, culture, ethnicity, language, religion, sexual orientation and ability. Students also have had different experiences in school and in life that shape their attitudes, beliefs and skills they bring to the classroom. These factors influence how students conceive of their position relative to the institution of education and the larger purpose of learning. They influence why and how students engage in learning, and they can also inform the specific strategies and supports that students will need to learn best. Competency-based systems reflect and respond to the student populations they serve. They seek to meet students where they are, design culturally relevant learning environments and learning experiences, ensure supports that help student succeed and respond to the broader social and political context that continues to influence those identities.

Questions adapted from Springpoint Schools³³

What are the assets that your students from different communities and neighborhoods bring to your school?

Who are your students and what are the implications for the design of your school, learning environments, pedagogy and supports?

- What experiences — in school and out — have students had before they come to your school?
- What have students already learned — in school and out — to know, do, or be?
- What expectations do students bring to your school — for you and for themselves?
- What goals, ambitions and dreams do the students coming to your school hope for?

If you want to personalize professional learning, you are going to end up using design thinking to do it. There just isn't any way you can actually meet people where they are AND get to where you want to go. Our design process is completely iterative, as we are designing within a context of the culture of a growth mindset, effective practices to support more agency and independence in our learners, and, eventually, the graduate competencies based on the graduate profile the community is creating.

- Heather Flick, Professional Learning Facilitator, District 51, CO, 2016³²

Local Context

Local context matters. Competency-based systems will need to consider and be responsive to the dynamics of the community, regional and state context. Although competency-based systems share common indicators of quality, each will necessarily look different based on a variety of influential factors. Leaders and practitioners are often strategic and inclusive from the outset, engaging stakeholders in collaborative design processes. Collaboration does not end with design, but extends throughout implementation and continuous improvement. Leaders in competency-based systems account for the following dimensions of local context.

Community. Learning does not occur in a vacuum. Competency-based systems respond to attributes of the communities, many of which are dynamic. These include demographics and demographic changes, mobility, socioeconomic context and family compositions. Competency-based education systems account for interactions between education and other institutions, including housing, health, transportation, social services and justice systems. Competency-based education systems also take into account community assets: historical traditions, community institutions, and leaders that engage in making learning systems strong and vital. They seek to promote trust with communities, which may necessitate confronting historical tensions and challenges.

Education landscape. Competency-based systems recognize that learning does not begin and end with a student's experience between the ages of five and eighteen or between the hours of eight and three. The K-12 system exists in direct relationship with systems of early and higher education, as well as systems of extended and informal education. Leaders seek to engage representatives from these education systems as collaborators from the earliest stages of design through implementation and continuous improvement to ensure that K-12 systems are part of a larger learning ecosystem.

Industry landscape. Likewise, competency-based systems recognize that learning is not contained to the education system alone. While employment is not the sole purpose of an education, it is an important purpose for many individuals, families, and communities. Leaders recognize this, and consider the current and future local economic and employment context when designing K-12 systems. They engage industry as a partner, whether in designing pathways from school-to-work or in designing opportunities for students to apply knowledge to real-world problems.

Policy landscape. Particularly at the district and school levels, competency-based systems must account for federal, state and local policy. These may include graduation, promotion, funding and school choice policies. It is important to note that the practice field can outpace the policy field; depending on the landscape, leaders may find themselves designing competency-based systems within less than optimal policy conditions.

Historical context. Nothing begins with a blank slate. Competency-based systems are designed and implemented against the backdrop of previous efforts at change, reform and innovation. Competency-based leaders account for this history by building on lessons learned, honoring the work that has been done and developing change narratives that integrate the perceptions people have about where they have been and where they want to go.

What historical developments, dynamics, and patterns shape how your community relates to your district or school?

What local factors influence your school's values?

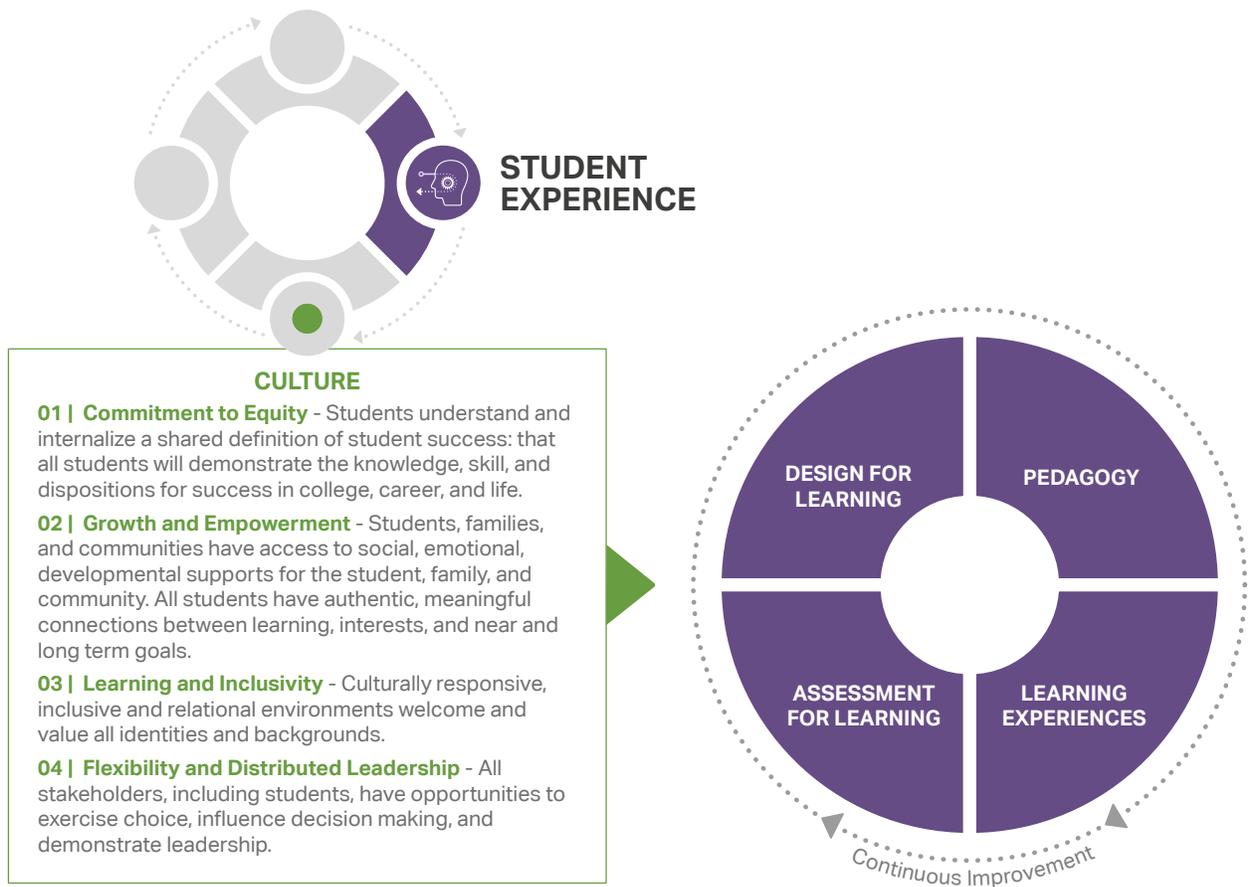
In what way does your local economy shape how the community, parents and students value education?

V. Logic Models

Logic models are tools used to clarify change efforts and to support the evaluation of effectiveness. In this paper, we use logic models to describe four levels of practice: the student experience, professional practice, district and schools systems and culture. Each logic model includes:

- **Culture** - Each logic model includes a description of the cultural conditions and capacities that support them. Culture is identified as its own level of practice, but we also know it permeates *all* levels of practice and must be emphasized throughout.
- **Domains and Elements** - Moving from left to right, each logic model describes specific elements clustered into domains:
 - » Key systems and structures;
 - » Activities, actions, and strategies; and
 - » Outcomes, measures and evaluation.
- **Continuous Improvement** - Each logic model also includes a continuous improvement cycle. Circular arrows surround all of the practices described in the logic model, emphasizing that leaders and teachers refine practices based on data, student learning and development, feedback and reflection.

Figure 3. Student Experience Logic Model



DESIGN FOR LEARNING	PEDAGOGY	LEARNING EXPERIENCES	ASSESSMENT FOR LEARNING
<p>05 Transparent outcomes for student learning include clear definitions of mastery.</p> <p>06 Learning continua articulate sequence that students must master and support strategic pacing.</p> <p>07 Multiple pathways exist for students to achieve mastery of common learning outcomes, based on co-created plans.</p> <p>08 Learning tasks ensure all students experience supported challenge with multiple points of entry, and balance broad content knowledge with deep conceptual and enduring understandings.</p> <p>09 Universal design ensures timely, developmentally appropriate and neurologically diverse supports for all students.</p>	<p>10 Personalized flexible instruction responds to students' goals, interests and academic/developmental needs.</p> <p>11 Instructional scaffolding, including pacing and supports, ensures students can engage working memory, manage cognitive load and address gaps.</p> <p>12 Monitoring and feedback of student progress across multiple domains is ongoing and transparent between students and teachers.</p> <p>13 Student agency is emphasized in all instructional practice; teachers emphasize engagement and motivation, academic behaviors, metacognitive and social skills so students can own their learning.</p> <p>14 Timely differentiated supports are available to students to be sure they are on path towards mastery.</p>	<p>15 Students have access and exposure to multiple, varied demonstrations of concepts and knowledge that explicitly build on their' prior knowledge and context.</p> <p>16 Students engage with learning through multiple, varied means that include meaningful practice, collaborative learning, and dialogue.</p> <p>17 Students apply and demonstrate learning in meaningful contexts and with authentic audiences.</p> <p>18 Students transfer conceptual and enduring understandings to new domains and contexts.</p> <p>19 Recuperation and extension opportunities allow students to mitigate specific learning gaps and/or deepen learning in areas of interest and strength.</p>	<p>20 Formative and summative assessments support learning and encourages deeper learning. Students have multiple opportunities to demonstrate mastery.</p> <p>21 Students and teachers continuously reflect on evaluation and feedback related to cognitive, metacognitive, social, and emotional progress, and use feedback to revise student pathways and plans.</p> <p>22 Students and teachers continuously improve by applying reflection insights to shift learning design, pedagogy, and learning experiences.</p> <p>23 Advancement and certification are based on demonstration of mastery. Timely supports ensure students continue along learning progressions.</p>

Learning Culture - Leaders, teachers and students collaborate to design, cultivate and reinforce conditions that are rooted in what we know about optimal learning and development. Students understand the common expectations for student success and connect this vision of success to outcomes that they find to be personally meaningful. Students experience belonging and inclusion among their teachers and peers. They receive robust supports that are attentive to their cognitive, developmental, physiological, social and emotional needs. Students and all stakeholders have voice and agency in what and how they learn, and contribute to decision-making within the classroom environment. Students and all stakeholders have voice and agency in what and how they learn, and contribute to decision-making within the classroom environment.

Design for Learning - Leaders and teachers design systems to maximize learning. Specifically, they align definitions of student success and build upon the drivers of the learning sciences and equity strategies to create systems that fully support learning. Learning continua, learning tasks, assessments and personalized supports for learning seek to develop academic knowledge, transferable skills and the building blocks of learning to prepare students for lifelong learning. As a result of this purposeful and coherent design, all students have opportunities to achieve common learning outcomes along personalized pathways. Learning tasks challenge students with appropriate amounts of rigor within their zone of proximal development. Systems ensure students can benefit from timely and developmentally appropriate supports. The design for learning integrates universal supports that help all students — including those with special needs and language learners — have the right supports to access meaningful and challenging content. Students reflect on their learning and progress to support metacognitive development.

Pedagogy - There is no single instructional strategy in competency-based systems, but all emphasize pedagogy that puts student needs at the center and empowers students to drive their own learning. Students experience instruction that meets their needs and excites their intrinsic motivations. Students can engage working memory and manage cognitive load more effectively when learning is located within their zone of proximal development. Teachers manage this by scaffolding learning, pacing learning and providing flexible supports. Students and teachers share timely and transparent feedback throughout the learning process, helping to develop student agency at every turn, build foundational academic knowledge and enhance higher order skills. Student-centered pedagogy ensures students develop self-advocacy skills necessary to drive their own learning. Students receive timely and differentiated supports to be sure that they have what they need to succeed. Timely and differentiated supports are essential in a competency-based environment because teachers can meet students where they are while also ensuring that they are progressing at a meaningful pace toward proficiency and graduation.

Learning Experiences - Learning experiences are grounded in the learning sciences, providing all students with developmentally appropriate, personalized opportunities to access, engage, apply, revise, demonstrate and transfer learning. Instruction explicitly builds on students' prior knowledge. Students engage in learning through a variety of means and mediums, including seeking feedback, engaging in deliberate practice, collaborating and participating in dialogue. All students have opportunities to engage in social and cooperative learning and to develop language that supports cognition and higher order thinking. Students apply learning in meaningful contexts, often with authentic audiences, and have opportunities to transfer key concepts and enduring understandings across disciplines and contexts. Finally, students have opportunities within the learning environment to address and correct specific learning gaps (ensuring they progress based on full mastery) and to extend learning (going deeper and/or farther in areas of interest or strength).

Assessment for Learning - Competency-based learning environments align systems of assessments to inform learning experiences and improve learning outcomes. Assessment plays multiple roles: it provides feedback for students, informs instructional improvement, certifies learning and contributes to accountability for student success. Assessments are aligned with the student success outcomes including performance-based tasks and assessments to ensure students are building higher order skills. The role of different types of assessment should be clear and transparent to all stakeholders.

Students experience assessment as productive, transparent and empowering. They have multiple opportunities to demonstrate mastery through assessment. They demonstrate agency in defining their learning through a variety of mediums not limited to tests and assessments. They use feedback from assessments to engage in deep reflection on what they are learning, how they are learning and who they are as a learner. Students and teachers use feedback and reflection to improve learning strategies and experiences. Student progression is based on demonstration of mastery, not completion of seat time. Assessment practice is critical to achieving learning and development: authentic and empowering assessment promotes engagement, motivation, persistence, self-regulation and learning outcomes. Teachers use assessment for the purposes of instructional design, feedback and ongoing student supports.

What Will Students Experience in a Personalized, Competency-Based School? ³⁵

Below are examples of experiences that every student should have in a well-developed personalized, competency-based system.

- I will be fully supported in developing academic knowledge and skills, the ability to apply what I have learned to solve real-world problems and the capacities I need to become an independent and lifelong learner.
- I feel safe and am willing to put forward my best effort to take on challenging knowledge and skills because I have a deep sense of belonging, feel that my culture, the culture of my community and my voice is valued, and see on a daily basis that everyone in the school is committed to my learning.
- I will have opportunity and support to learn the skills that allow me take responsibility for my learning and exercise independence.
- I have access to and full comprehension of learning targets and expectations of what proficiency means.
- I have opportunity to learn anytime, anyplace, with flexibility to take more time when I need it to fully master or go deeper and to pursue ways of learning and demonstrating my learning in ways that are relevant to my interest and future.
- I am able to own my education by learning about things that matter to me in ways that are effective for me with the support that allows me to be successful.
- I will receive timely feedback, instruction and support based on where I am on the learner continuum and my social emotional development to make necessary progress on my personalized pathway to graduation.
- My learning will be measured by progress on learning targets rather than level of participation, effort or time in the classroom.
- Grades or scoring provide feedback to help me know what I need to do to improve my learning process and reach my learning goals.
- I can advance to the next level or go deeper into topics that interest me as soon as I submit evidence of learning that demonstrates my proficiency.

B. Professional Practice

What Are the Professional Practices that Contribute to Student Learning and Development?

Educators play important roles in shaping the experiences that contribute to student learning and development. In **Figure 4. Professional Practice Logic Model**, professional practice is comprised of professional culture, professional and pedagogical systems, instructional design, adult learning and continuous improvement. These core elements of professional practice align with our knowledge of student and adult learning and reflect expectations that professional learning will contribute to student learning. In competency-based systems, students and teachers are learners, and their learning processes are integrally related.

The learner continuum has had a huge impact on teachers and our teaching. The focus of the professional learning communities changed.

Now they talk about practice, look at work samples, and decide whether assessments are effectively aligned. Teachers' sense of their own efficacy has increased.

- Aida Cruz-Farin, Principal, Blair Elementary, Waukesha School District, WI, 2017³⁶

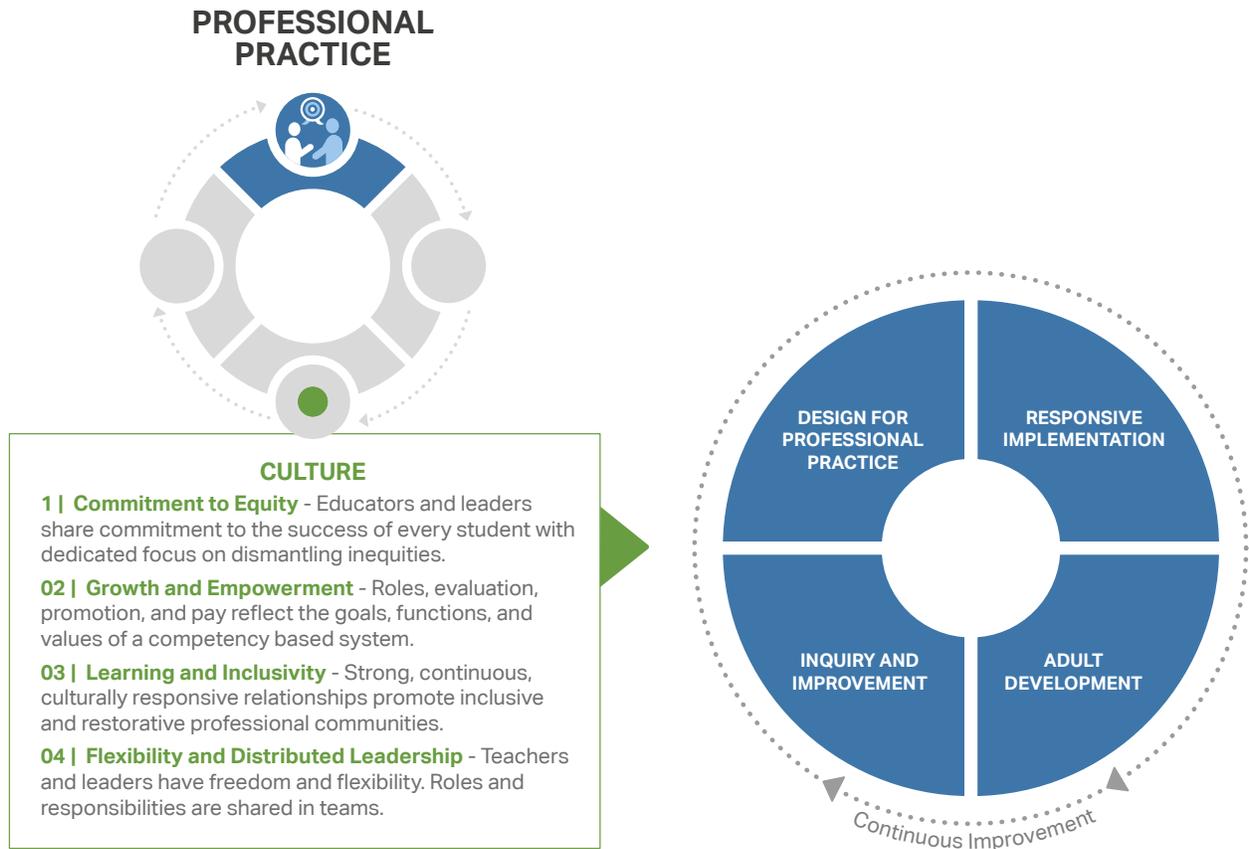
In what ways is professional learning in your district and school aligned (or not) with the cornerstones of the science of learning?

What is in place to ensure teachers have opportunity to build their knowledge and skills in response to real-time data on student learning?

To what degree do teachers have the autonomy and support to use their professional judgment to respond to students that are struggling?

Your Insights
and Inquiries

Figure 4. Professional Practice Logic Model



DESIGN FOR PROFESSIONAL PRACTICE	RESPONSIVE IMPLEMENTATION	ADULT DEVELOPMENT	INQUIRY AND IMPROVEMENT
<p>05 Professional competency frameworks of critical cognitive, instructional, intrapersonal, and interpersonal knowledge and skills.</p> <p>06 Pedagogical frameworks promote shared understanding of expectations for effective teaching and assessment.</p> <p>07 Integrated learning and data systems promote transparent access to instructional content and materials, student data and student progress.</p> <p>08 Robust instructional materials are available to teachers to support quality instructional design.</p>	<p>09 Teachers design for inclusion, creating structures that promote relationships and cultural relevance.</p> <p>10 Teachers design for rigor and mastery, using knowledge of content and learning continua (standards) to design learning experiences.</p> <p>11 Teachers design for development, using knowledge of SEL and identity development to support the whole child and promote independent learning.</p> <p>12 Teachers demonstrate assessment literacy, using formative and summative assessment to design for mastery.</p> <p>13 Teachers personalize learning to build agency and meet students' academic & development needs.</p> <p>14 Teachers utilize resources strategically to meet students' needs.</p> <p>15 Teachers ensure students have access to timely differentiated supports.</p>	<p>16 Teachers and leaders have personal growth plans and pathways.</p> <p>17 Teachers and leaders have embedded and dedicated opportunities for professional learning; learning is integrated into instructional practice and routines and there are opportunities for focused training and education.</p> <p>18 Teachers and leaders have opportunities to receive and reflect on personal feedback and support aligned to growth plans.</p> <p>19 Systems, structures, and resources support sustainable planning, teaming and collaboration.</p> <p>20 Evaluation promotes growth and development aligned with definitions of professional competency and pedagogy, and allows learning through failure.</p>	<p>21 Instructional practice is rooted in relevant, responsive, research based inquiry about student development and performance.</p> <p>22 Instructional teams engage in rapid, responsive data reflection using multiple sources such as formative assessment, student work, and observation.</p> <p>23 Instructional teams iterate and improve practice (curriculum assessment, instructional strategies, student supports) based on research and data practices.</p>

Culture - Competency-based systems cultivate conditions in which teachers operate with autonomy, collaborative relationships and meaningful support. It starts with developing a professional culture that respects each individual's personal and cultural identity, proactively elevates voices that are often at the margins, and promotes inclusion.

Professional culture in competency-based systems emphasizes relational and professional trust. Relational trust means teachers proactively, consistently and systematically cultivate strong relationships with each other, students and families. These relationships are the foundation for personalization, student belonging and student development. Professional trust entails commitment to collaboration and to being a part of a unified team, as well as commitment to providing authentic support for teachers to engage in risk-taking, reflection and learning. Professional culture is grounded in a commitment to equity evidenced by a collective responsibility for each student's success. Teachers find purpose and even joy in their collaborative efforts and rely on their relationships to sustain them through challenges and setbacks. Teachers have the autonomy to use their professional judgment to make decisions about learning and teaching within their collaboration with other teachers. Teachers and leaders have opportunities to reflect on and adjust professional culture based on their experiences and feedback from stakeholders.

Design for Professional Practice - Professional systems are aligned to expectations for student learning. Although competency-based systems do not prescribe singular ways of teaching — in fact, they promote autonomy and allow teachers to have creativity in their practice — they do create clarity and transparency around expectations for instructional practice. This includes collaborating to define shared understanding of student success and proficiency, as well as creating shared definitions of professional competency. Definitions of professional competency — what it means to be an effective teacher and leader — include cognitive, instructional, intrapersonal and interpersonal competencies. In other words, they include not just what teachers have to know and be able to do, but also the mindsets and dispositions, all of which are critical to teaching practice.³⁷

Competency-based systems also define pedagogical principles: common understanding of what good learning and teaching actually look like in practice. This creates shared understanding and offers opportunities for professional learning and collaboration. When the technology is available, integrated learning and data systems make it possible for educators to access student data, instructional content and learning materials. Competency-based systems move away from approaches such as scope and sequence and uniform assessment toward more flexible instructional resources such as modular units. Whatever the approach to curriculum, competency-based systems seek to provide teachers with access to high-quality instructional materials that align to learning continua, research-based learning progressions and assessments.

Instructional Design - Teachers do not simply deliver curriculum, they design environments and learning experiences that ensure all students can be successful. Teachers have autonomy within the bounds of their school's and district's shared expectations and structures. To engage in this practice teachers must have a broad set of competencies, including but not limited to student development and support, instructional design and assessment literacy. Teachers design for inclusion, proactively creating the structures and conditions that promote relational belonging and cultural competency. Teachers also design for mastery and development: they leverage learning sciences and content knowledge expertise in relationship to students' cognitive and social and emotional development to design pathways, tasks and supports. Assessment fluency is an integral aspect of instructional design: teachers in competency-based systems use their knowledge of assessment to promote mastery and actively use feedback with students to inform learning. Personalization is paramount. To promote equity and ensure all students are successful, teachers design structures, supports and flexible resource strategies that ensure each student has access to what she or he needs to learn. Moreover, teachers work with students to access timely and differentiated supports.

Adult Development - Adult development mirrors and supports learning experiences for students. Like students, teachers have personal learning plans aligned to expectations for competency development. These plans have intrinsic value as they are connected to personal aspirations that are informed by student learning. Based on these plans, teachers have opportunities to experience embedded learning (opportunities for development that are integrated into their daily practice), as well as dedicated learning (opportunities to engage in focused, targeted learning and continued education). Teachers, like students, receive regular feedback and use that feedback to reflect and improve performance.

In competency-based systems that emphasize distributed leadership and shared accountability, teaching is a cooperative practice rather than an individual one. Teachers have supported, structured and sustainable opportunities for meaningful collaboration, including peer-to-peer learning, collaborative teaching, shared planning and collaborative data practice. Teacher evaluation aligns with expectations for teacher competency and development: evaluation frameworks and processes reflect competency frameworks, incentivize and reward the expectations that are set for instruction and pedagogy and contribute to an environment where teachers have the psychological safety to challenge themselves, learn and continuously improve.

Inquiry and Improvement - Teaching is a process of continuous inquiry and improvement. Instructional practice is rooted in action-based research, as teachers seek to define and understand critical questions related to student learning and development. They use multiple types of evidence to define, test and revise hypotheses and improve their approaches to learning and teaching. Data practice is particularly important in competency-based systems, where personalization and flexibility demand critical attention to individual students' learning, progress, advancement and needs. Data practice and looking at student work are also important for moderating definitions and assessments of competency to be sure all students are reaching desired learning outcomes.

C. School and District Systems

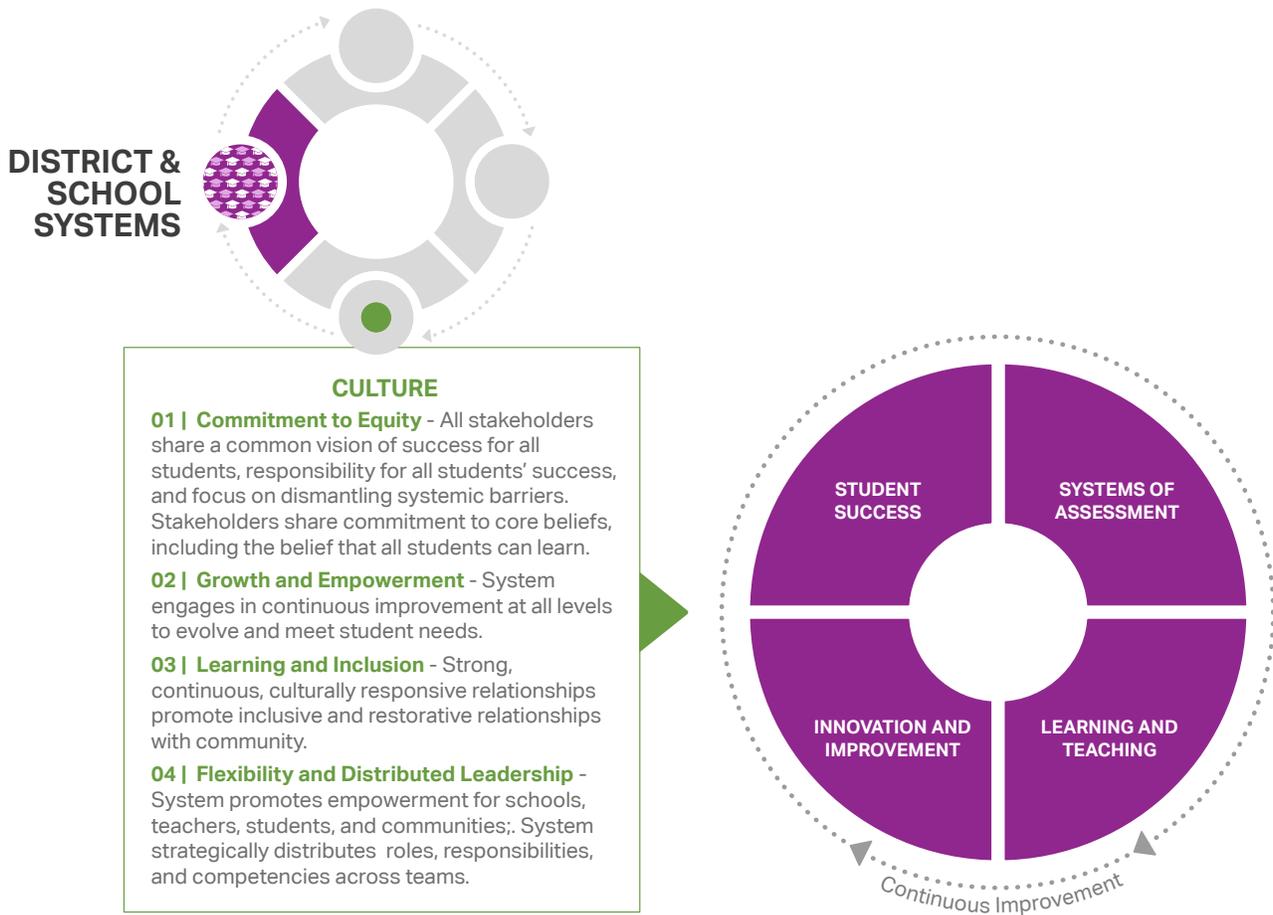
What Elements of School Systems Promote Competency-Based Education?

While competency-based education places substantial power and autonomy in the hands of teachers, aligned and thoughtful policies, practices, and structures are needed to create high-quality, equitable systems. State, district and school systems (as well as charter management organizations and other educational networks) shape and sustain professional practice and student experiences that contribute to student success. As outlined in **Figure 5. School and District System Logic Model**, the core elements of these systems — their culture, the ways they define student success, their systems of assessments, their approaches to learning and teaching including the strategies for providing timely and differentiated support, and their innovation and improvement systems — promote coherence while allowing the flexibility necessary for local practice.

We aren't asking teachers what they are going to cover but what skills students will have when they leave their class. It is the difference between covering standards or uncovering learning. We are looking at the learning now and want to know what students can do with their new learning, not just the content covered.

- Michael Martin, Director of Curriculum and Technology, Montpelier School District, VT, 2016³⁸

Figure 5. District & School Systems Logic Model



STUDENT SUCCESS	SYSTEMS OF ASSESSMENT	LEARNING AND TEACHING	INNOVATION & IMPROVEMENT
<p>05 System articulates a shared definition of student success that includes cognitive, interpersonal and intrapersonal domains.</p> <p>06 System defines meaningful graduation competencies that reflect readiness for college, career and life.</p> <p>07 System certifies learning meaningfully based on demonstration of mastery.</p> <p>08 System defines transparent and shared learning continua and progressions, including key milestones for mastery.</p> <p>09 System demonstrates capacity and flexibility to meet students where they are in their learning while advancing them toward mastery and graduation.</p>	<p>10 System aligns systems of assessments around a theory of action for learning and development.</p> <p>11 System develops assessment literacy as a key competency for teachers and leaders.</p> <p>12 System provides timely transparent feedback on student learning and development utilizing multiple types of assessments and evidence of learning.</p> <p>13 System communicates progress based on learning objectives to multiple stakeholders in a timely manner.</p> <p>14 System uses assessment for the purposes of shared accountability for student success.</p> <p>15 System uses assessment for the purposes of continuous improvement at all levels.</p>	<p>16 System demonstrates instructional coherence, aligning outcomes, instruction, activities, and assessments.</p> <p>17 System demonstrates professional coherence, aligning competencies, development, and evaluation.</p> <p>18 System defines shared standards for teaching practice based in the learning sciences.</p> <p>19 System prioritizes adult development in core competencies and personalizes adult learning.</p> <p>20 System has integrated learning management systems to support instruction, inquiry, and improvement.</p> <p>21 System prioritizes agency, social emotional support and development for all students.</p> <p>22 System is designed to promote strong, inclusive, and culturally responsive learning environments.</p>	<p>23 System has continuous improvement processes and infrastructure in place.</p> <p>24 System invests in the design and redesign of learning environments and schools to move toward quality implementation of competency based education.</p> <p>25 System offers flexible supports to help schools continuously improve and move toward quality implementation of competency based education.</p> <p>26 System engages in strategic innovation efforts to develop, test, and grow new learning, teaching and school design approaches.</p>

learning milestones mapped backwards from graduation guidelines. It is clear to all stakeholders where a student is in their learning and where they are in relationship to key learning benchmarks. Finally, competency-based education systems meet students where they are. Learning experiences and supports are designed to meet students at their current levels of learning and support their progress toward mastery. This does not mean that a student who is once behind will remain behind. Rather, it means that teachers, leaders and students have the capacity to understand where a student is, where they should be on their learning continuum, and how to get them there. And it means that all students, whether they are “behind” or “ahead,” will have access to deep and meaningful learning that promotes real mastery.

Systems of Assessment³⁹ - Systems of assessment are coherent, aligned around a theory of action for student development, graduation guidelines and learning continua. They promote both continuous improvement and accountability. Assessment is useful and empowering for students and teachers as they engage in feedback, reflection and improvement. It helps students reflect on and own their learning and empowers them to improve their learning strategies and performance. It helps teachers meet students where they are, informs student supports and advance them along learning paths. Districts and schools invest in building capacity around assessment literacy as it plays such a critical role in competency-based systems. Because transparency is key in competency-based systems, it is imperative that teachers and leaders have systems to clarify and communicate student progress to multiple stakeholders. As stated previously, it must always be clear to all stakeholders where a student is in their learning relative to long-term success.

Learning and Teaching Systems - Learning and teaching are aligned and coherent: critical aspects of instructional and professional design are coordinated across all levels of the system to promote quality practice. This does not mean that learning and teaching are uniform. It does mean that expectations are clear and consistent, that infrastructure exists to support learning and teaching, and that equity, inclusion and social-emotional supports are systemic. Based on definitions of student success, competency-based systems align instructional, professional and pedagogical systems: outcomes, instruction, learning activities, assessments, professional competencies, adult learning, teacher evaluation and definitions of pedagogical excellence are all aligned and coherent. Integrated learning management systems support quality instruction, inquiry and improvement at all levels. Supports including counseling, advisement, inclusive student communities and culturally responsive instruction, are prioritized, resourced and implemented.

Innovation and Improvement⁴⁰ - Competency-based systems constantly evolve to meet student, teacher and community needs. Systems, schools and classrooms exhibit the agility and flexibility needed to drive continuous innovation and improvement. They have infrastructure for improvement. They engage in intentional design and redesign. They provide flexible supports, and they invest strategically in innovation. Continuous improvement infrastructure includes data systems, data practices and timely improvements that respond to challenges, needs, failures and opportunities. These capabilities require responsive communication with practitioners, systems for rapid problem definition and problem-solving, and structural flexibility. At a school level, teachers and leaders continuously design and redesign learning environments, learning experiences and instructional practices to better meet student needs. Design and redesign are rooted in rapid and responsive data practice. Given the amount of flexibility needed in schools and classrooms, competency-based districts are more responsive than bureaucratic. They recognize that, like students, schools will need different supports to succeed, and therefore prioritize providing responsive school-centered supports. Finally, the field of education is constantly evolving as the world changes, as communities adapt, and as we learn more about the way people learn. Competency-based systems invest strategically in innovation to continually seek out, discover, test and share new practices.

D. Culture

What Cultural Conditions Are Necessary to Ensure High-Quality Implementation of Competency-Based Education?

A strong culture of learning, inclusiveness and empowerment is necessary to fully realize a quality competency-based system. Culture applies at all levels of the system: the classroom, the school, the district and community. Although everyone contributes to the culture, district and school leaders play especially important roles in cultivating these conditions and capacities at a system level so that they can more easily be cultivated in schools and classrooms.

A culture conducive to competency-based education is non-negotiable, but it is not a prerequisite to getting started. Leaders should not consider cultural conditions as “readiness factors” to be in place prior to embarking on the pathway to competency-based education. Rather, leaders should develop routines, rituals and implementation strategies that cultivate and reinforce the culture they desire so that it strengthens over time. Leaders can assess their systems against the desired cultural conditions and develop clear, phased, supported plans to nurture them. Individual aspects of competency-based culture, structures and pedagogy may be implemented in the absence of these conditions and capacities, but they will not achieve quality in their absence. In **Figure 6. Culture Logic Model**, the four domains of culture necessary for high-quality competency-based education are highlighted: commitment to equity; growth and empowerment; learning and inclusivity; and distributed leadership and flexibility.

How would you describe the intended culture (formal) of your district and school? How does it compare to the culture that actually exists (informal) and is experienced by students?

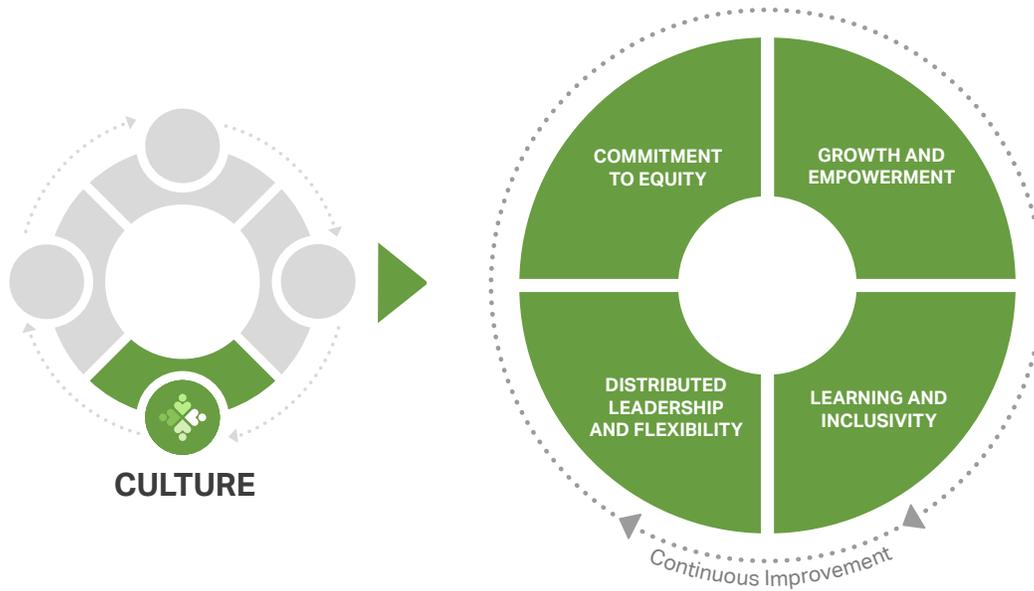
In what ways are bureaucratic or hierarchical decision-making practices in place and in what ways are more distributed leadership and decision-making used to ensure that the people closest to the problem have the flexibility to quickly find and implement a solution?

Everyone in the education system has to model ‘agency’ and the empowerment of others. The superintendent has to honor agency with principals, principals with teachers, and teachers with kids. Remember — kids learn from what we do, not from what we say.

- Don Siviski, former Superintendent of Instruction, Maine Department of Education and currently School Change Coach, Center for Secondary School Redesign, 2015⁴¹

Your Insights and Inquiries

Figure 6. Culture Logic Model



COMMITMENT TO EQUITY	GROWTH AND EMPOWERMENT	LEARNING AND INCLUSIVITY	DISTRIBUTED LEADERSHIP AND FLEXIBILITY
<p>01 Articulate definitions of success for students, teachers, and schools that recognize broader purposes of education and reflect community values.</p> <p>02 Set accountable, transparent goals to achieve high outcomes for all students.</p> <p>03 Create culturally responsive, inclusive learning communities and teams.</p> <p>04 Address bias and develop the beliefs, mindsets, and capacity of adults to be leaders for equity.</p> <p>05 Utilize resources and policy to disrupt institutional inequities.</p> <p>06 Utilize instructional and school design practices to ensure equal access to high value learning experiences and that students have the supports they need.</p>	<p>07 Commit to belief that all students can learn at high levels.</p> <p>08 Commit to engaging in personal reflection and growth, including growth related to personal and cultural identity.</p> <p>09 Demonstrate a proactive orientation to change and continuous improvement.</p> <p>10 Demonstrate growth mindset and tolerance for learning through smart failure.</p> <p>11 Value student and adult agency, empowerment, and self direction.</p>	<p>12 Cultivate relationships, learning environments and learning experiences that respect each student's and adult's personal and cultural identities.</p> <p>13 Foster authentic relationships between the community and students.</p> <p>14 Actively promote trust, empathy, collaboration and social learning across all elements of diversity.</p> <p>15 Establish freedom to fail as a part of learning and improvement, utilizing feedback to ensure accountability.</p> <p>16 Promote collaborative and social professional practice and pedagogies.</p>	<p>17 Enable distributed leadership and reciprocal accountability;</p> <p>18 Ensure students and educators are empowered to make decisions that support their personal learning paths and progress.</p> <p>19 Provide schools and teachers with autonomy and flexibility to personalize for students and the learning community.</p> <p>20 Foster collective responsibility for ensuring students succeed.</p> <p>21 Promote continuous improvement and reflective practice to ensure progress and accountability to goals.</p>

Commitment to Equity - Equity is a moral stance. It is also a critical aspect of the educational culture. A culture committed to equity begins with definitions of success for students, teachers and schools that reflect the broader purposes of education and align to community values. Systems set goals to achieve high outcomes for all students, transparently monitor progress toward goals and have systems of accountability in place for meeting key milestones of progress. An important step is for schools, classrooms and teams across the system to cultivate culturally responsive and inclusive conditions. In addition, resources and policies should be allocated through an equity lens. Instructional and school design practices ensure that all students have access to high-value learning opportunities — no students are ever tracked — and that all students have access to the resources and supports they need to succeed.

Growth and Empowerment - We are all learners, and we are all agents of our own futures. Competency-based systems are rooted in these beliefs, and so they seek to continually model and develop them. First and foremost, competency-based education systems reinforce commitment to the belief that all students of all backgrounds and identities can learn at high levels. They prioritize growth mindset for students and adults and a willingness to engage in personal reflection, providing effective feedback and opportunities to take advantage of failure with more instruction, practice and revision. Second, they value agency and self-direction for all stakeholders. Practices include guidance on building the lifelong learning skills — metacognition, self-regulation, social and emotional skills, and the habits of success — and creating opportunities for students and adults to shape school culture and decisions.

Related to this, they emphasize being open and welcoming of change and improvement. They articulate the “why” behind the need to transition away from the traditional system and help all stakeholders imagine and explore new educational paradigms. Beliefs are tricky: No one can tell another person what to believe, and beliefs are hard to change. Nonetheless, competency-based systems firmly articulate beliefs that are valued in the system, use these beliefs as lenses to make decisions about practice, policy, hiring and operations. Systems may be proactive about hiring individuals who share these beliefs and mindsets, but most systems will also need to actively support existing teachers, leaders and staff to develop them over time. Through balancing support and accountability, schools can provide opportunities for adults to look closely at practices and the beliefs upon which they rest.

Learning and Inclusivity - Learning sciences emphasize the critical importance of relationships: students and adults learn and develop best when they experience strong relationships and a sense of belonging. Competency-based districts and schools emphasize relational environments that validate, reflect and respect every student’s and every teacher’s personal and cultural identities, while also actively promoting empathy, understanding and learning across all dimensions of diversity. Relationships do not occur by accident or happenstance. Rather, learning environments are designed to ensure that there is time, space and support for relationships to develop. Structures that support relationship building can include class size, multi-age bands, school size, teacher assignment, student grouping and cohort development, advisement structures and school day and year schedules. As relationships develop, so do trust and empathy. As trust and empathy develop, so does freedom for risk-taking, failure and improvement. In other words, psychological safety and continuous improvement are supported by the trust and security that come from deep, continuous relationships.

Flexibility and Distributive Leadership - Competency-based systems demand autonomy and flexibility. These characteristics are critically important to culture as they promote empowerment, learning, innovation and improvement. They are also critically important to effective implementation and operation: personalized supports cannot be implemented without the freedom of educators to make decisions that are in their best interests of students and in the best interest of the learning community. Therefore, competency-based systems distribute leadership at all levels, from boardrooms to classrooms, to foster collaborative professional practice and ensure adults can truly share accountability for student outcomes. They enable autonomy at all levels, locating decision-making authority as close as possible to practice so that teachers, leaders and students are empowered to drive learning.

Relatedly, schools are granted adequate autonomy to personalize their learning communities and student supports. Leaders may worry that flexibility and autonomy will lead to management challenges or variability in quality and outcomes across the system. For this reason, it is important to clarify that flexibility and autonomy are bounded: they are guided and constrained by all stakeholders’ accountability to shared goals and collaborative culture that keeps any one person from becoming an island.

VI. Concluding Remarks: Where Do We Go from Here?

This framework is a snapshot of what we currently understand about the elements of a high-quality competency-based education system. It is just the beginning. Teachers and leaders will need additional direction and support to understand not just what competency-based education looks like, but also how to get there. Districts and schools will need formative feedback to ensure that they are implementing with depth and fidelity. More research and evaluation will be invaluable to assess the accuracy of this depiction of competency-based education and to identify the most impactful elements of a competency-based system. Thus, this paper represents a starting point for a new phase of intensive learning, reflection and adjustment.

This framework can be used as a foundation upon which to build more knowledge of effective practices and implementation. Several years ago, most districts were using a similar strategy for making the transition as described in *Implementing Competency Education in K-12 Systems: Insights from Local Leaders*.⁴² However, as interest in competency-based education has grown, so too have the entry points and implementation strategies. Expanding upon this framework, it will be valuable to create case studies highlighting levers, the four logic models and the elements described within each logic model. Guides to getting started, implementation pathways and playbooks, and quality rubrics could be developed as extensions of this framework to guide the field.

This paper attempts to bridge the research and practice divide, giving researchers and practitioners common language and a common framework to connect what educators do on a daily basis with the most emergent knowledge about human learning and development. Moving forward, we will need to create new and additional platforms for practitioners and researchers to collaborate. We need to increase practitioners' access to the research base that informs personalized competency-based systems, identify and fill gaps in the research so that it is useful to the field, and co-design evaluations that reflect the core elements of competency-based systems while taking into account local context.

There is also substantial need to create other tools and resources to communicate with different stakeholder groups that are interested in understanding why a new system of education is needed, what it means to their children and their communities, and what to anticipate as schools make the transition. As has been emphasized in the framework provided here, the local context matters and will matter deeply for local communities. Thus, it may be useful to create a clearinghouse with examples of how districts and schools are communicating as well as the national efforts to create multi-purpose tools.

Finally, continued work is needed to better understand the implications of the levers described here, specifically outcomes, learning sciences and equity, to analyze federal and state policy and to sculpt the next set of policies that could both grow and sustain competency education.

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Glossary

Assessment Literacy

Assessment literacy is the collection of knowledge and skills associated with appropriate assessment design, implementation, interpretation, and, most importantly, use. A critical aspect of assessment literacy is that educators and leaders know to create and/or select a variety of assessments to serve different purposes such as improving learning and teaching, grading, program evaluation, and accountability. However, the most important component of assessment literacy is the degree to which educators and others are able to appropriately interpret the data coming from assessments and then take defensible instructional or other actions.

Calibration

Calibration is a process of adjusting results based on a comparison with a known standard or “calibration weight” in order to allow defensible comparisons of student assessment results; for example, across different entities (e.g., schools, districts, states). In order to define a calibration weight, we need to have something in common, either the same students taking different assessments or different students taking the same assessments. The latter is generally more practical, so common performance tasks have been administered to students in different schools, and district performance assessments serve as a “calibration weight” to evaluate the extent to which teachers in different locales evaluate the quality of student work similarly.

Comparability

Comparability is defined as the degree to which the results of assessments intended to measure the same learning targets produce the same or similar results. This involves multiple levels of documentation and evaluation starting from the consistency with which teachers in the same schools evaluate student work similarly and consistently, to the degree to which teachers in different schools and districts evaluate student performances consistently and similarly, and finally the degree to which the results from students taking one set of assessments can be compared to students taking a different set of assessments (such as comparing pilot and non-pilot districts). A determination of “comparable enough” for any type of score linking should be made based on clear documentation for how comparability is determined and that it is defensible.

Competency-Based Education

Competency education, also known as mastery-based, proficiency-based, or performance-based, is a school- or district-wide structure that replaces the traditional structure to create a system that is designed for students to be successful (as compared to sorted) and leads to continuous improvement. In 2011, 100 innovators in competency education came together for the first time. At that meeting, participants fine-tuned a working definition of high quality competency education, which includes five elements:

- Students advance upon demonstrated mastery.
- Competencies include explicit, measurable, transferable learning objectives that empower students.
- Assessment is meaningful and a positive learning experience for students.
- Students receive timely, differentiated support based on their individual learning needs.
- Learning outcomes emphasize competencies that include application and creation of knowledge, along with the development of important skills and dispositions.

Continuum or Learning Continuum

A continuum refers to the set of standards or learning targets along a span of education (for example, K-12 or performance levels 9-12). It is the set of expectations for what students should know and be able to do. However, it does not imply that students need to learn all of the standards in a linear way or be taught them based on their age-based grade level. The student learning trajectory and research on learning progressions should inform instruction.

Curriculum

There are many definitions of curriculum in education. Internationally, the term curriculum or curriculum frameworks refers to the high level knowledge and skills students are expected to learn and describe (i.e., competencies). The curriculum framework may include student learning objectives or learning standards.

In the United States, the term curriculum also refers to the resources that teachers use when designing instruction and assessment to support student learning, including: the course syllabi, units and lessons that teachers teach; the assignments and projects given to students; the materials (books, videos, presentations, activities) used in a course, module, or unit; and the assessments used to evaluate student learning and check for understanding.

CompetencyWorks will use the term learning experiences to refer to the design of the learning process and the accompanying set of resources to support student learning.

Culturally Responsive Teaching

First coined by Gloria Ladson-Billings in 1994, culturally responsive teaching is the pedagogical practice of recognizing, exploring, and responding to students' cultural contexts, references, and experiences. Cultural responsiveness builds upon eight principles:

- Communication of High Expectations
- Active Teaching Methods
- Practitioner as Facilitator
- Inclusion of Culturally and Linguistically Diverse Students
- Cultural Sensitivity
- Reshaping the Curriculum or Delivery of Services
- Student-Controlled Discourse
- Small Group Instruction

The New York City Mastery Collaborative highlights that a competency-based approach can promote cultural responsiveness in the following ways:

- Transparency: path to success is clear and learning outcomes are relevant to students' lives and interests. Shared criteria reduce opportunity for implicit bias.
- Facilitation shifts: refocus the roles of students and teachers to include flexible pacing, inquiry-based, collaborative approach to learning. Students drive their own learning, and teachers coach them.
- Positive learning identity: growth mindset and active learning build agency and affirm students' identities as learners (academics, race, ethnicity, gender, sexual orientation, etc.).

Deeper Learning

The term deeper learning is often used to describe highly engaging learning experiences in which students apply skills and knowledge and build higher order skills. The Hewlett Foundation defines deeper learning as six competencies: master core academic content; think critically and solve complex problems; work collaboratively; communicate effectively; learn how to learn; and develop academic mindsets. Deeper learning intersects with competency-based education in multiple ways, including defining the learning outcomes; emphasis on lifelong learning skills such as academic mindset and learning how to learn; and importance of applying skills and knowledge to build competencies.

Educational Equity

There are many definitions of equity in education. *CompetencyWorks* will use the definition from the National Equity Project: *Education equity means that each child receives what he or she needs to develop to his or her full academic and social potential. Working towards equity involves:*

1. *Ensuring equally high outcomes for all participants in our educational system; removing the predictability for success or failures that currently correlates with any social or cultural factor;*
2. *Interrupting inequitable practices, examining biases, and creating inclusive multicultural school environments for adults and children; and*
3. *Discovering and cultivating the unique gifts, talents, and interests that every human possesses.*

Equality

Equality is related to the principles of fairness and justice. It refers to equal treatment and, in the past, has been used to refer to equal inputs. *CompetencyWorks* uses the term equality as an aspirational goal of all students reaching their full potential.

Fixed Mindset (See Growth Mindset)

Carol Dweck's research suggests that students who have adopted a fixed mindset — the belief that they are either “smart” or “dumb” and there is no way to change this — may learn less than they could or learn at a slower rate, while also shying away from challenges (since poor performance might either confirm they can't learn, if they believe they are “dumb,” or indicate that they are less intelligent than they think, if they believe they are “smart”). Dweck's findings also suggest that when students with fixed mindsets fail at something, as they inevitably will, they tend to tell themselves they can't or won't be able to do it (“I just can't learn Algebra”), or they make excuses to rationalize the failure (“I would have passed the test if I had had more time to study”). (Adapted from the Glossary of Education Reform edglossary.org.)

The traditional system of education was developed based upon a fixed mindset and resulted in a belief that part of the K-12 system's function was to sort students.

Growth Mindset (See Fixed Mindset)

The concept of a growth mindset was developed by psychologist Carol Dweck and popularized in her book, *Mindset: The New Psychology of Success*. Students who embrace growth mindsets — the belief that they can learn more or become smarter if they work hard and persevere — may learn more, learn it more quickly, and view challenges and failures as opportunities to improve their learning and skills. Dweck's work has also shown that a “growth mindset” can be intentionally taught to students. (Adapted from the Glossary of Education Reform edglossary.org.)

Competency education is grounded in the idea that all students can succeed with the right supports, including learning how to have a growth mindset.

Habits of Work/Habits of Mind (Referred to in this paper as Habits of Success)

Habits of work and habits of mind are directly related to the ability of students to take ownership of their learning and become self-directed learners. There are a variety of Habits of Work (specific practices or behaviors) and Habits of Mind (skills, perspectives, and orientation) that help students succeed in school or the workplace. Schools tend to focus on a few of the habits of work and mind to help students learn the skills they need to take ownership of their learning. See *Learning and Leading with Habits of Mind*.

Higher Order Skills/Deeper Learning Competencies

Higher order skills refer to skills needed to apply academic skills and knowledge to real-world problems. The term can refer to the higher levels on Bloom's or Webb's taxonomy or to a set of skills such as creativity, critical thinking, problem-solving, working collaboratively, communicating effectively, and an academic or growth mindset.

Learning Resources

The materials explored during a course, module, unit, or activity: videos, images, audio, texts, presentations, etc.

Learning Experiences

The term learning experiences is used to convey the process and activities that students engage in to learn skills and knowledge. The term refers to the package of outcomes and targets, activities, resources, assessments, and pedagogical strategies that are associated with a course, module, or unit. In the United States, this is generally referred to as curriculum. (See definition of Curriculum.)

Learning Progression

Learning progressions are research-based approaches and maps how students learn key concepts and skills as described in Achieve's briefing *The Role of Learning Progressions in Competency-Based Pathways*.

Learning Sciences Research

The learning sciences are concerned with "the interdisciplinary empirical investigation of learning as it exists in real-world settings." Core components of learning sciences research include:

- Research on thinking: including how the mind works to process, store, retrieve, and perceive information;
- Research on learning processes: including how people use "constellations of memories, skills, perceptions, and ideas" to think and solve problems, and the role that different types of literacies play in learning; and
- Research on learning environments: including how people learn in different contexts other than a direct instruction environment with a core principle of creating learner-centered learning environments.

Lifelong Learning Skills

In the paper *Lifelong Learning Skills for College and Career Readiness: Considerations for Education Policy*, AIR describes lifelong learning skills as providing "the foundation for learning and working. They broadly support student thinking, self-management, and social interaction, enabling the pursuit of education and career goals." *CompetencyWorks* uses the term to capture the skills that enable students to be successful in life, navigating new environments, and managing their own learning. This includes a growth mindset, habits of success, social and emotional skills, metacognitive skills, and higher order/ deeper learning competencies.

Moderation

Moderation is a process used to evaluate and improve comparability. The process involves having teachers (or others) work to develop a common understanding of varying levels of quality of student work. Moderation processes are often used as part of calibration, but moderation is a way to evaluate comparability while calibration is the adjustment based on these findings.

Personalized Approach to Learning or Personalized Learning

iNACOL defines personalized learning as "tailoring learning for each student's strengths, needs and interests – including enabling student voice and choice in what, how, when and where they learn – to provide flexibility and supports to ensure mastery of the highest standards possible." Personalized learning takes into account students' differing zones of proximal development with regards to academic and cognitive skills, as well as within the physical, emotional, metacognitive, and other domains.

Barbara Bray and Kathleen McClaskey explain in the PDI Chart that personalized learning is learner-centered, whereas the related approaches of differentiation and individualization are teacher-centered. Thus, teachers may use a personalized and differentiated approach to meet students where they are.

Social and Emotional Learning

According to CASEL, “social and emotional learning (SEL) is the process through which children and adults acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions.” They focus on the development of five competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making.

Student Agency

Student agency or student ownership of their education refers to the skills and the level of autonomy that a student has to shape their learning experiences. Schools that want to develop student agency will need strategies to coach students in the lifelong learning skills (growth mindset, meta-cognition, social and emotional learning, and habits of work and learning) and to establish practices that allow students to have choice, voice, opportunity for co-design, and the ability to shape their learning trajectories.

Student Learning Trajectories

CompetencyWorks refers to trajectories as the unique personalized path each student travels to achieve learning goals on the way to graduation. Educators apply what is known about learning progressions toward helping students make progress on their trajectory.

Universal Design for Learning (UDL)

CAST defines Universal Design for Learning as “a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn.” UDL guides the design of instructional goals, assessments, methods, and materials that can be customized and adjusted to meet individual needs.

Zone of Proximal Development (ZPD)

A term developed by psychologist Lev Vygotsky to refer to the moment(s) during the learning process that lives between what one can do on one’s own and what one cannot do at all. It is the zone in which guidance and support is needed in order to become independently competent. A personalized approach to learning provides students with access to learning experiences attuned to students’ individual ZPD — which sometimes overlaps with others’, but frequently may not.

Endnotes

- 1 There is a body of research, a number of frameworks and a multitude of phrases to describe the set of knowledge, skills and dispositions that are used to describe college and career readiness. Please see Transcend's *Defining Graduate Aims* at <http://bit.ly/2yjW4UG>.
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